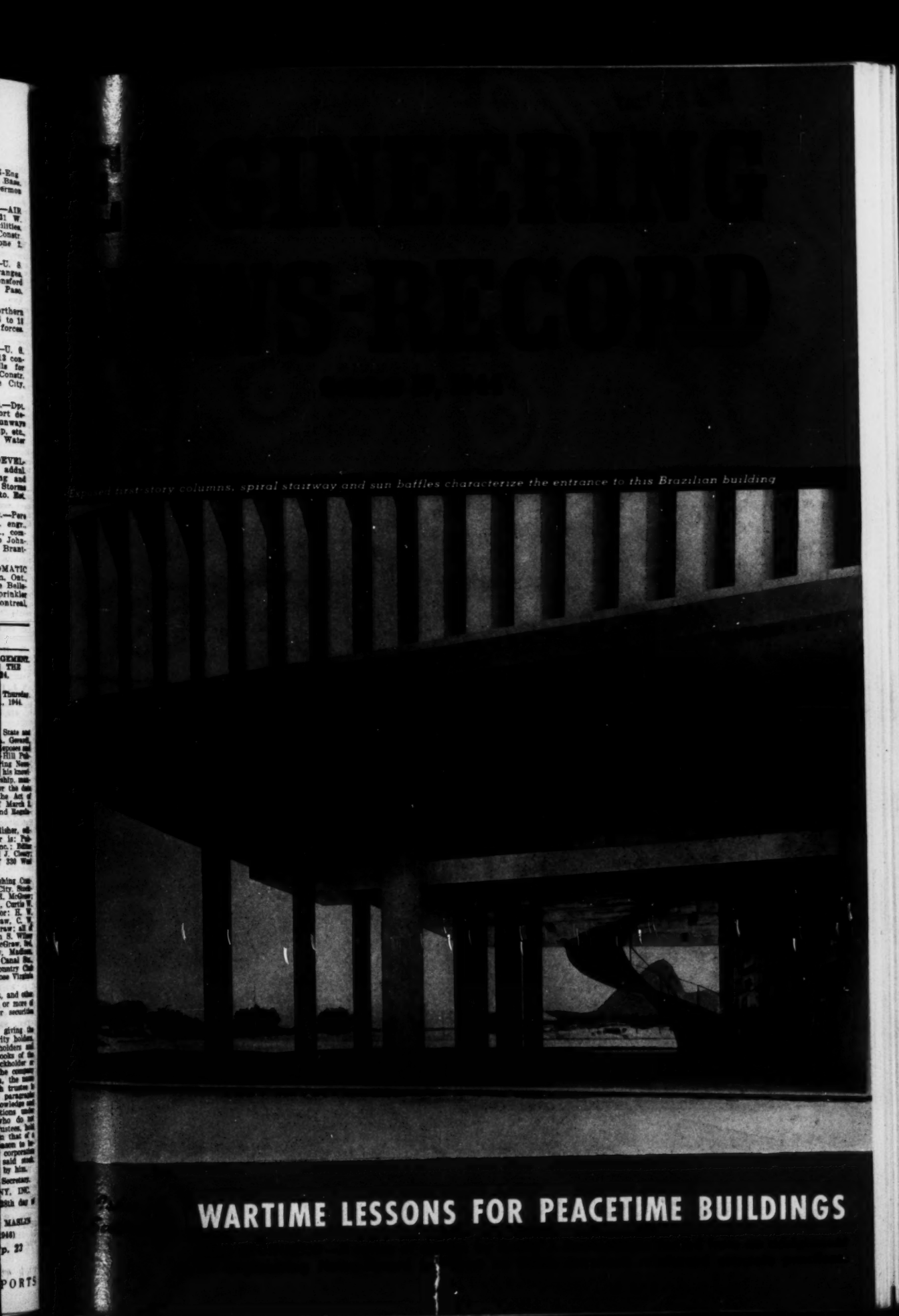
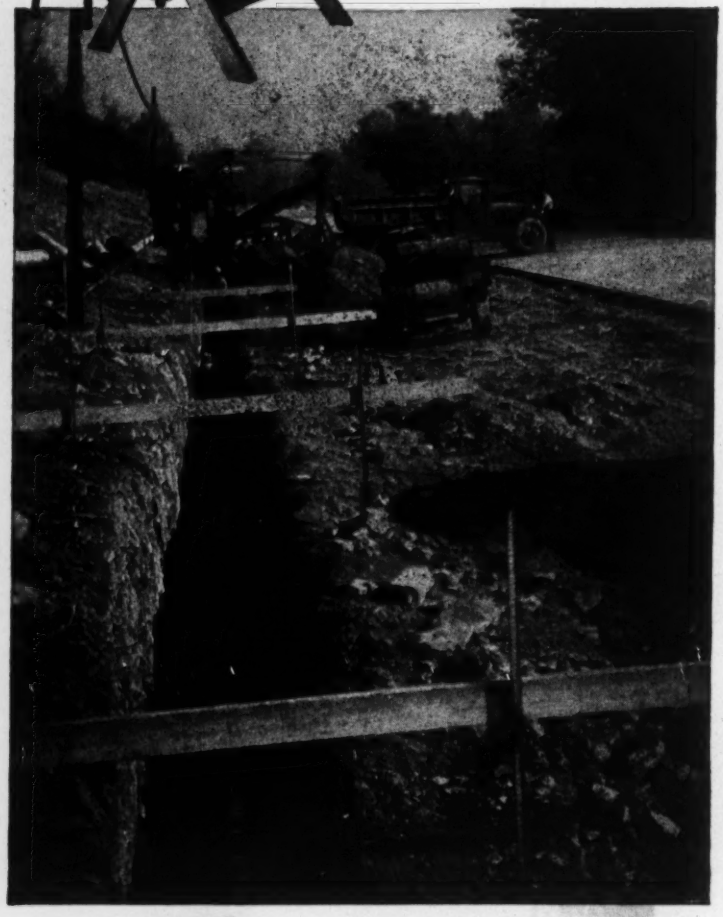


Exposed first-story columns, spiral stairway and sun baffles characterize the entrance to this Brazilian building

WARTIME LESSONS FOR PEACETIME BUILDINGS

are you planning now for BETTER POSTWAR HIGHWAYS?



When Victory is won, your highway construction plans will play a vital part in making jobs for returning service men and workers now in war industries. It is desirable and important that these plans be ready.

It is also important that they be truly "plans for the future." Postwar highways must not be subject to the ills of so many of our present roads, where annual breakups hike maintenance budgets and delay traffic.

Experience proves that wet and spongy subgrades are a major cause of road surface failures. Isn't it logical to make certain that postwar roads are built on a stable foundation? You can help do this by specifying ARMCO Perforated Pipe wherever it is needed to intercept and remove harmful groundwater. Then maintenance costs will remain low while traffic enjoys a smooth, safe, uninterrupted ride.

So include ARMCO Perforated Pipe in your plans for the future, even though you may not be able to get it for immediate construction. You'll like its flexible corrugated metal strength, tight joints, and immunity to damage from shifting soils, traffic impact or severe frost action. Write for whatever information you may need. Armco Drainage Products Association, 415 Curtis St., Middletown, O.

ARMCO

ARMCO PERFORATED PIPE

ENGINEERING NEWS-RECORD

Buildings, Sewers, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Shipbuilding, Irrigation, Canals, Railroads

McGRAW-HILL PUBLISHING COMPANY, INC.

Executive Office: 99-129 North Broadway, Albany 1, N. Y. • Editorial and Executive Offices: 330 West 42nd Street, New York 18

JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

133 OCTOBER 19, 1944 No. 16

...MING NEXT

...ching of the 30,000-ton battle-... *Oklahoma*, blasted and left in ...almost upside down position by ...Jap's sneak-raid on Pearl Harbor ...ides one of the most interesting ...neering feats of the war in the ...fic. Through the use of a series ...ultiple cables rigged over high ...mes, compound pulleys and re-...ion gears, the big ship was ...d to an upright position by ro-... The project will be described ...e Nov. 2 issue.

...e gallant and successful fight ...llied forces on the beaches at ...rno in the invasion of Italy is ... history, but why Salerno was ...ed instead of Naples—the most ...al point of entry for the seizure ...large port—is answered in "Air-... for the Invasion of Italy" to ...ublished in *ENR* for Nov. 2.

...cent prosecution of violations ...overnment regulations affecting ...uilding industry disclose that a ... segment of the industry is un-...iar with the many regulations ...hich they are required to con-... In the Nov. 2 issue, these reg-...ons will be reviewed and ex-...ed in detail in an effort to bring ...-*Record* readers up-to-date on ... controls, wages and material ...

...OKING AHEAD

...ystem of vehicle tunnel ventila-... combining the economies of ...udinal ventilation with the ... features of transverse ventila-...as been developed for use in ...Squirrel Hill Tunnel, a major ...nt of the projected Penn-Lin-... Parkway at Pittsburgh. This ... will be described in an early ...

... Ohio Department of High-...is using 125,000 gal. of paint ...ffic guide stripes on 10,500 mi. ...d annually, and doing the job ... cost of $2.30 per mile. Shop ...bled trucks apply one to three ... at a speed of 15 mph. Paint ...agitated, atomized and blown ...e pavement. Walk-type ma-... formerly used for painting ... stripes averaged less than ... miles per day at a cost of ... per mile. Complete story is ...led for an early issue.

	Page
News of the Week	83
Comment and Discussion	91
Editorials	92
Powered Concrete Ships of World War II.... R. E. MC LAUCHLIN	94
Portable Railway Bridges Precision Built..... R. J. WOOD	99
Bases for B-29's Built by Engineer GI's	103
Batching Concrete for B-29 Bases.... CAPT. H. E. M. STEVENSON	105
Detroit Expressway Built for Safety	107
Special Section on Wartime Lessons for Peacetime Building...	109
Postwar Effect of Emergency Building Specifications..... C. A. WILLSON	119
South American Building is Challenging..... A. J. BOASE	121
An Architect's View on Teamwork in Building Design..... T. H. CREIGHTON	129
An Engineer's View on Teamwork in Building Design..... F. N. SEVERUD	131
Designing the Synthetic Rubber Plants	135
Waterproof Parapet Walls..... A. W. CONSOER	139
Unit Prices	140
News of the Week	143
Elections and Activities	148
Men and Jobs	150
New Trade Publications	156
New Aids to the Constructor	165
Manufacturers' Activities	170
Construction Reports	237

Number of copies of this issue printed: 35,944

DO YOU WANT AN INDEX?

Due to the paper shortage, no index for the volume just completed, No. 132 (January-June, 1944) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below. The index is now ready for distribution.

Editor—Engineering News-Record
McGRAW-HILL PUBLISHING COMPANY
330 West 42d Street, New York 18, N. Y.
Please send Index to address below

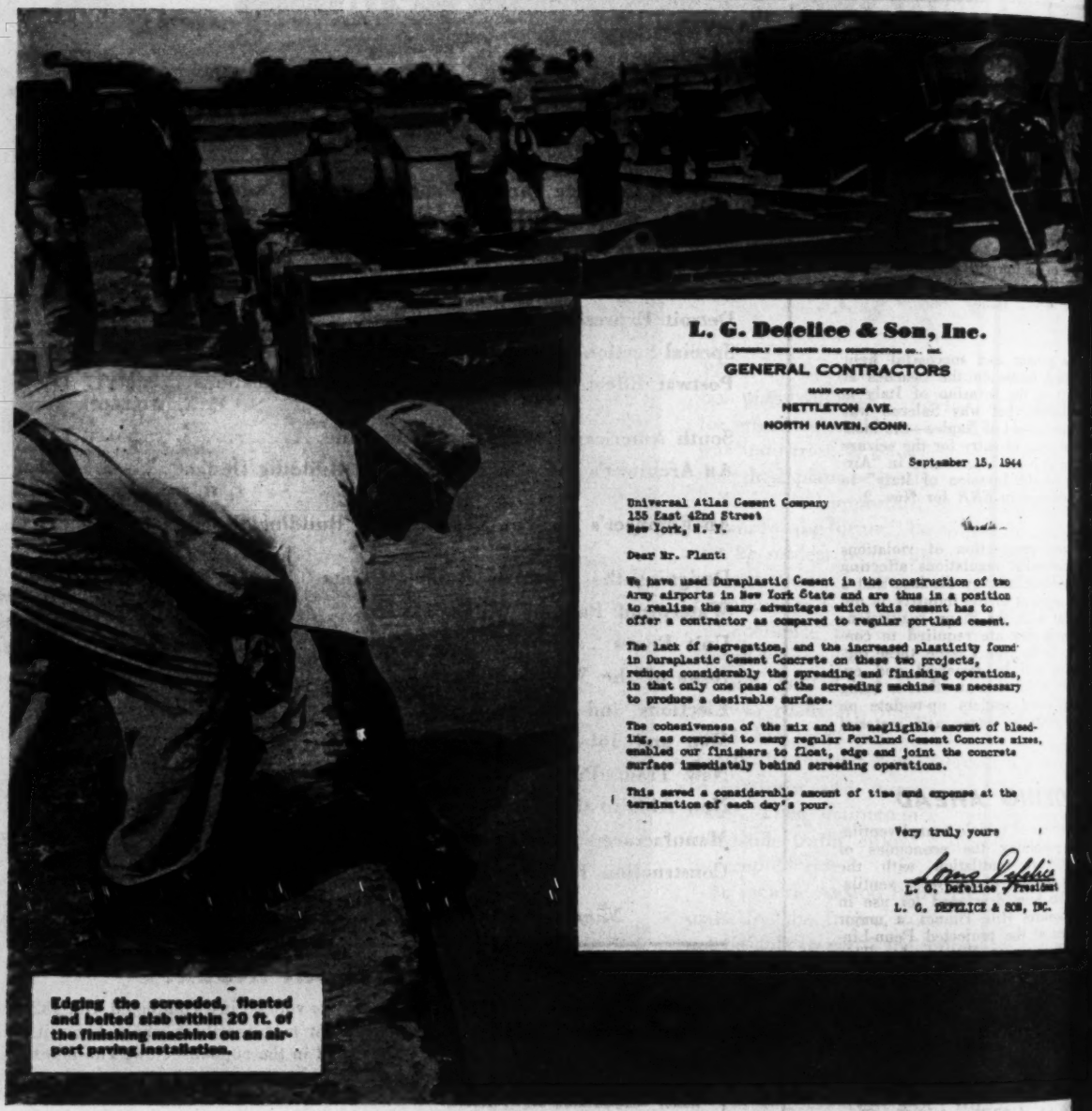
Name .....

Street .....

City .....

Contractor speeds paving operations with Atlas DURAPLASTIC* air-entraining cement

Greater plasticity, lack of segregation and absence of bleeding save time on each day's operation



Edging the screeded, floated and belted slab within 20 ft. of the finishing machine on an airport paving installation.

L. G. Defelice & Son, Inc.

GENERAL CONTRACTORS

MAIN OFFICE
NETTLETON AVE.
NORTH HAVEN, CONN.

September 15, 1944

Universal Atlas Cement Company
135 East 42nd Street
New York, N. Y.

Dear Mr. Plant:

We have used Duraplastic Cement in the construction of two Army airports in New York State and are thus in a position to realize the many advantages which this cement has to offer a contractor as compared to regular portland cement.

The lack of segregation, and the increased plasticity found in Duraplastic Cement Concrete on these two projects, reduced considerably the spreading and finishing operations, in that only one pass of the screeding machine was necessary to produce a desirable surface.

The cohesiveness of the mix and the negligible amount of bleeding, as compared to many regular Portland Cement Concrete mixes, enabled our finishers to float, edge and joint the concrete surface immediately behind screeding operations.

This saved a considerable amount of time and expense at the termination of each day's pour.

Very truly yours

L. G. Defelice, President
L. G. DEFELICE & SON, INC.

ATLAS DURAPLASTIC CEMENT

A Universal Atlas Product

BNR-D-9

*Trade Mark Registered, U. A. C. Co.; all rights reserved

The Week In Engineering and Construction

GINEERING NEWS-RECORD • OCTOBER 19, 1944 • VOLUME 133 • NUMBER 16

Collective bargaining setup modified by A.S.C.E. board

lan whereby local sections of the American Society of Civil Engineers can activate bargaining units of ngineers is simplified.

cal sections of the American So- of Civil Engineers may set up the inery for establishment of collec- argaining units among engineering loyees without amending their con- tions under a revised method of ac- approved by the board of direction e society at its meeting held in Den- Colo., Oct. 9-10. This is the second that the board has found it desir- to modify its program for aiding eers to set up their own collective- ining units that was approved at tlanta meeting about a year ago. original action made it necessary ach section to amend its constitu- to authorize the establishment of a ittee on employment conditions, committee could then organize a of engineering employees inter- in collective bargaining, which s in turn could organize collective- ining units in individual com- s. Under the new plan, the com- s can be set up by action of the of any section.

out half the sections have amended constitutions under the original eal.

Referendum not authorized

e board had before it petitions by over 1,400 members of the asking that the whole matter of ociety's action on collective bar- g be made the subject of a refer- to the corporate members but it t authorize such a referendum as under consideration a survey of iews of both corporate members uniors as to future action of the in the light of experience gained te.

ilitary training study started

resolution adopted at the annual s meeting of the society, which if ved by the board, would have put the society on record as favoring universal military training, was the subject of an unfavorable report by the Committee on Engineering Education and was not approved by the board. The board did, however, authorize the president to appoint a committee to study and report on the problems involved in combining universal military training with the training of young engineers.

The board received and ordered printed the final report of its special committee set up to study and report upon a report on depreciation recently prepared by the Committee on Depreciation of the National Association of Railroad and Utilities Commissioners. This special committee report will be printed in *Proceedings* to facilitate discussion of it by members of the society. Copies also are being sent to the N.A.R.U.C.

Government fee protested

A resolution was approved by the board in protest against the current practice in Congress of setting the maximum fee for consulting services at $25 per day. The resolution stated that such a low fee was not in the best interest of the country, as able engineers could not afford to offer their service to

(*Continued on page* 86)

Secrecy lifted on artificial harbors built off Normandy beaches

One of the most spectacular engineering operations incident to the Normandy invasion last June was the sinking of long lines of ships and concrete caissons end to end to form sheltered anchorages or artificial harbors off the beaches in the Bay of the Seine. Kept a military secret until last week, censorship now permits publication of the broad general outlines of the plan.

Two harbors designed to handle more shipping than Cherbourg were created, one off the American beachhead at Vierville and the other 15 miles east, in the British sector at Arromanches. The American installation was badly damaged by the storm that occurred between D plus 13 and D plus 16, but the British facilities, in more sheltered water, operated at capacity from the beginning.

Each harbor was made up of three breakwaters. That nearest to shore, which was installed on D-plus-3 day, consisted of some sixty ships—Liberties, old freighters and obsolete warships totaling about 300,000 tons. Maneuvered into position, explosives were used to open up the ships quickly so that they settled to the bottom with their superstructures protruding. Antiaircraft guns on the superstructures formed part of the harbor defenses. This breakwater was planned to give complete protection to floating piers reaching into shore.

In contrast to the inner breakwater, the intermediate one was made up of huge concrete caissons of special design, perhaps 200 ft. long, 60 ft. wide and 60 ft. high, built in England and towed to the site by the greatest armada of tugs ever assembled. These caissons were sunk end to end and have a 10-ft. freeboard at high tide.

The outer breakwater was made of sunken ships and special units, including some partially submerged Liberty ships.

The piers protected by the breakwaters were made up of bridge trusses of perhaps 100-ft. span, resting on barges. Facilities at the outer end permitted landing craft to discharge their cargo directly onto the piers. By one estimate, there were about 10 miles of these piers installed.

The American harbor was built by the Seabees.

American company makes Dnieprostroy generators

International General Electric will supply nine 90,000-kva generators for the U.S.S.R. Dnieprostroy hydroelectric plant, according to an announcement by the company. The huge generators, already in construction at General Electric's Schenectady Works, will give the famous plant a 15 percent greater output capacity than it had originally.

The new generators will replace those partially destroyed by the Russians when they retreated before the Germans in 1941. The dam was blown up in August of that year. (*ENR* Sept. 4 1941. Vol. p. 321) The original generators for the plant, which was completed in 1933, were also supplied by I.G.E.

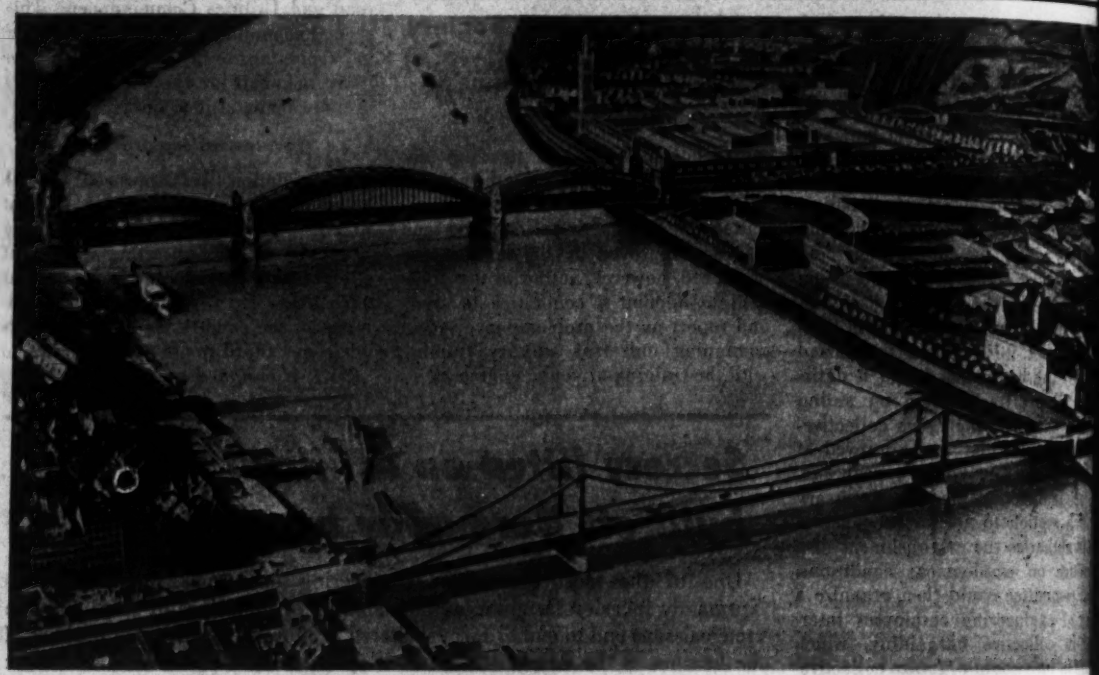
Hydraulic turbines for the station are being built by the Newport News Shipbuilding and Dry Dock Co. Each of these turbines will be capable of developing 100,000 hp.

Financing of the machines will be by the Soviet Union and not by lend-lease, according to an announcement by the War Production Board.

A $500,000 planning f... available for Maryla...

A fund of $500,000 to spur the ... ning of postwar projects to insure ... ployment throughout Maryland is ... available from the state treasury, ... Herbert R. O'Conor has announced.

The $500,000 planning fund wil... used to match funds of counties ... cities of the state on a 50-50 basis ... projects which are approved as gua... teeing considerable employment in ... immediate postwar era.



Crossings of Rhine at Cologne, objectives of U. S. First Army

Aachen is being defended by the Germans so stubbornly and will be given up so reluctantly because it is the key to Cologne, great industrial center and communication hub on the Rhine, and only about 30 miles away. Not the least of Cologne's assets are four major bridges across the Rhine, two of which are shown in the accompanying view.

The three-span steel tied arch is the Hohenzollern Bridge, really three parallel bridges on one set of piers having the unusual aggregate width of 136 ft. Two railroad lines and one vehicle roadway are accommodated, and it is said to carry the heaviest railway traffic of all large bridges in Germany. Span lengths are 390, 544 and 402 ft. The arches in the railway bridges are 30 ft. apart, and in the highway span 40 ft. The bridge was completed in 1911.

The suspension bridge in the foreground is known as the Cologne-Deutz Bridge, and is of the self-anchored type, quite similar to the Allegheny River crossings in Pittsburgh. Completed in 1915, it has a central span of 605 ft. and side spans of 302 ft. The "cables", chains of steel plate links, are set 63 ft. apart. The stiffening girders are of the box type, with a depth ranging from 10½ to 16½ ft.

Although this bridge is the first of suspension type built at Cologne, such a bridge, but of wire cable type was proposed in 1881. Its engineer, Franz Carl Guilleaume, was much influenced by the work of his friend John R. Roebling, who was engaged in the design and construction of the Brooklyn Bridge in New York at the same time. His dream of a wire cable suspension bridge, however, was never realized and it was not until 1929 that one of this type, the Cologne-Mulheim bridge was built. It has a 1,033 ft. main span, unloaded backstay spans of 300 ft. and is 72 ft. 10 in. wide between the stiffening girders which, in an unusual arrangement, pass through holes in the legs of the towers. Its roadway is 56.5 ft. wide.

The fourth major bridge at Cologne, known as the South Bridge, is a railway structure, also of tied-arch type, and has three ... of 333, 540 and 333 ft.

Cologne, moreover, is the site of ... the earliest of Rhine bridges known ... Constantine Bridge and built in about ... A.D. Long since gone it is preserved ... memory by a tablet on the Guildhall ... Cologne, carrying the following inscription ... In Latin: "To Flavius Constantinus the ... the noble fortunate sovereign, the ... quered son of the Emperior Constantius ... cause, to the immortal glory of the ... Empire and to the highest benefit and ... bellishment of the frontier of the Empire ... built for all time to come the difficult ... bridge to march his troops across the ... against the Franks to avoid the danger ... an invasion in Gaul. He fortified both ... of the Rhine by connecting the C... side with the Franconian side by a p... posed upon the river against the ... Another invasion now is threatened ... years later, and Cologne's bridges may ... be big factors in the outcome.

...dustrial waste treatment gets ...ttention at sewage works convention

...eam pollution control and improved plant operation also ...died at Pittsburgh meeting of Federation of Sewage Works ...ociations. A. E. Berry elected president.

...stepping any extensive discus... ...f possible federal aid in financing ...nstruction or extensions to exist... ...wage works, the Federation of ...e Works Associations at its fifth ...l meeting, held in Pittsburgh, Pa., ...ek, devoted its attention to the ...ms encountered in industrial ... treatment and the better opera... ...f existing facilities. The three... ...eeting, at which registrations ... 326, was held in conjunction ...he seventeenth annual conference ... Pennsylvania Sewage Works As... ...n.

...ing that sanitation works plan... ...s the responsibility of local and ...units, Charles A. Emerson, of ... and Emerson, Cleveland con... ...engineers, urged that these units ...ir own planning now regardless of ...l aid, or lack of it, in financing ...rk. He also called attention to ...rt sanitary engineers are playing ... development of postwar plans by ...g out that of the total postwar ...ng so far reported in the United ... 11 percent is for sewage works ...uction and 8 percent for water... ... construction. These figures were ...ared to those for years of normal ...uction activity wherein 4 percent ...or sewage works and 2.6 percent ...aterworks.

...e histories of planning work ac... ...finished will be presented soon in ...print Now in Action", according ... Emerson. This will be a second ... of the "Blueprint Now" cam... ...being conducted by the water and ...e associations of the nation.

...discussing Mr. Emerson's report, ... Filby, engineer and former field ...or for the "Blueprint Now" pro... ... stated that engineers and techni... ...blications must not allow interest ... planning work to fall off. "We ...t sit back", he said, "until every ...f any size has adequate sewerage ...wage disposal facilities."

...ontrolling stream pollution

...nsylvania's program of stream ...ion control was outlined by Dr. ... Stewart, Secretary of Health and ...an of the state Sanitary Water ... He said that aside from the ...fact that streams should be kept ...it is of vital moment to protect ...rface sources of supply on which most of the 1,000 public waterworks in the state depend.

This pollution control program has resulted in the classification of all streams into three categories, namely classes A, B, and C. Streams in the first group are those free from artificial contamination and subject only to casual and minor pollution. Class B streams are those more or less polluted but capable of reclamation.

The remaining, or class C streams, are those so polluted as to be unusable for public water supplies, incapable of supporting fish life, not used for recreational purposes and where it would be extremely difficult or inadvisable to attempt to restore them to a clean condition. Notable in this class are the coal

A. E. Berry, president of F.S.W.A.

field streams unusable at present because of their contamination by silt and acid drainage from coal operations.

Looking ahead to attacking the problem on a state-wide basis, Dr. Stewart said that the Sanitary Water Board proposes that all sewage shall receive a minimum of primary treatment before discharge into state waters. This treatment would consist of quiescent sedimentation or its equivalent and should remove about 35 percent of the polluting matter. If conditions indicate the need, then complete treatment will be required. This treatment should remove approximately 85 percent of the pollution load. Exception will be made in the case of those streams now receiving such large quantities of acid drainage as to render treatment of sewage of no public value.

Correspondingly, industrial wastes are to be treated to an equivalent degree and the coal operators have been ordered to cease the discharge of silt to the streams. An extensive program of sealing abandoned mines is now underway to eliminate acid mine drainage to streams.

Bettering sewer performance

A symposium on the operation of sewerage systems resulted in extensive discussion. E. T. Cranch, director of public works, New Rochelle, N. Y., in a paper on "Locating Lost Sewers and Manholes", described an adaptation of waterworks pipe-finding methods to the sewerage field. Using flexible sewer rods for the transmitter of an M-scope, "lost" sewer pipes, especially those with unmapped bends, were located within narrow limits without resort to extensive and costly digging. Lengths of pipe up to 200 ft. were located by this method when buried about 5 ft.; those buried 15 ft. were followed for a distance of about 100 ft. Buried manholes were readily found, but caution in the use of the instrument was advised since it is affected by other buried metallic substances.

Discussion of this paper brought out the use of a new type "torpedo" transmitter on the end of the flexible rods, thus making the location of longer lengths of "lost" pipe possible.

Other papers of the symposium dealt with control of infiltration and storm water flow, and with the ventilation of sewers to disseminate explosive mixtures and to provide relief from concrete disintegration due to the presence of hydrogen sulphide in the sewer atmosphere. Abstracts of these latter papers will be published in an early issue, as will those of other papers presented at the technical sessions.

New officers

Albert E. Berry, director, sanitary engineering division, Ontario department of health, was elected president of the federation for the coming year to succeed A. M. Rawn, chief engineer and general manager, Los Angeles County Sanitation District. J. K. Hoskins, Assistant Surgeon General, U. S. Public Health Service, is the new vice-president.

W. W. De Berard, city engineer of Chicago, was re-elected treasurer, and W. H. Wisely continues to serve as executive secretary and editor of the *Sewage Works Journal*.

Honorary membership was conferred on F. W. Mohlman director of laboratories for Chicago Sanitary District and editor of the *Journal* from 1929 to 1943.

A.S.C.E. board modifies bargaining plan

(*Continued from page* 83)

the government at so low a rate. It was recommended that the maximum be set at not less than $100 a day.

Honorary members

The board elected to honorary membership in the society the following members: A. J. Dyer, chairman of the board, Nashville Bridge Co., Nashville, Tenn.; Maj. Gen. Charles P. Gross, chief of the Army Transportation Corps; Horace W. King, professor emeritus, Ann Arbor, Mich.; L. C. Sabin, vice president, Lake Carriers Assn., Cleveland; and Arthur Surveyer, consulting engineer, Montreal and past president of the Engineering Institute of Canada. Honorary membership will be conferred on these men at the annual meeting in January.

No places for the quarterly meetings next year other than the annual meeting in New York were fixed, but Chicago was selected tentatively for the spring meeting of the board and for a spring meeting of the society if one is to be held.

• • •

J. C. Stevens nominated for president of A.S.C.E.

John C. Stevens, consulting engineer of Portland, Ore., was named as the official nominee for president of the American Society of Civil Engineers at the meeting of the nominating committee of the society held in Denver on Oct. 9. Election takes place just prior to the society's annual meeting in January.

Mr. Stevens was born in Kansas in 1876 and went to Portland soon after graduation from the University of Nebraska. He has made his home in the Northwest since that time except for two years spent on engineering work in Spain. He will be the society's first president to come from that part of the country.

Work with the U. S. Geological Survey took Mr. Stevens to Portland in 1906. Four years later he entered private practice, specializing in irrigation and power. In 1930 he went into partnership with R. E. Koon and has continued private practice in Portland since then.

Mr. Stevens has been active in the affairs of the American Society of Civil Engineers for many years. At present he is chairman of the society's committee on hydraulic research. He is author of numerous papers on water supply.

A. C. Polk, consulting engineer, Birmingham, Ala., and Ernest E. Howard, of Howard, Needles, Tammen & Bergendoff, Kansas City, were nominated for vice presidents.

J. C. Stevens

Nominees for new directors are: Thorndike Saville, dean of the college of engineering, New York University; Charles W. Bryan, vice president, Federal Shipbuilding & Dry Dock Co., Kearny, N. J.; Howard T. Critchlow, chief engineer, New Jersey State Water Policy Commission; John H. Gardiner, district engineer, U. S. Geological Survey, Tucson, Ariz.; H. F. Thomson, vice president, General Material Co., St. Louis; and Oscar H. Koch, consulting engineer, Dallas, Texas.

• • •

Eight dams for one suggested by Vermont

In place of the single large flood control and power dam proposed by the War Department for a site near Williamsville, Vt., on the West River, tributary of the Connecticut River, the Vermont State Planning Board would build eight smaller dams on the headwaters of the West.

In a report issued last week by the board, it was emphasized that the proposed small dams would inundate their reservoir areas only during the flood period whereas a power dam would require continuous storage. It was also indicated that the state plan, which would cost $9,514,240, as compared with an unofficial estimate of $9 million for the single dam, would not inundate, as would the large dam, some of the villages whose residents have led the fight against the War Department's proposal. The subject of states rights is also involved in the controversy.

Brooklyn-Battery Tunnel work can now proceed

On Oct. 16 Mayor F. H. La Guardia of New York announced that the War Production Board had authorized the manufacture of 790 tons of bolts, nuts and washers for the Brooklyn-Battery Tunnel (*ENR* Sept. 21, p. 331).

The Mayor said that "perhaps in three or four months" men would be back at work on the project. The tunnel on which work stopped in January 1943, because of material shortages, will be one of the first projects on the city's program for postwar employment.

The Mayor gave a warning to labor that jurisdictional disputes on the tunnel would interfere with re-employment. Saying that he hoped construction could be resumed at the Battery end as well as at the Brooklyn end of the tunnel, he added: "There will be more work coming along if we can get the proper cooperation."

• • •

Concrete ship weathers coastal hurricane

One of the powered concrete ships built for the U. S. Maritime Commission, the *S. S. Joseph Aspdin*, successfully rode out the full force of the tropical storm on the east coast in September. Waves estimated by the captain at 90 to 100 ft. high and winds of 120-mph velocity were encountered both before and after an hour of calm as the ship passed through the dead center of the hurricane. Some small gear was damaged but the crew, 75 percent young men just out of a training school, had no difficulty with the ship.

An article describing the design and construction of the *Aspdin* and 25 other concrete ships built by McCloskey & Co. at Tampa appears on page 472 of this issue.

• • •

Fairbanks, Alaska, wants steam-heated water

A steam-heated water system will be constructed by the city of Fairbanks, Alaska, if the Federal Works Agency approves an application presented to it recently by city officials.

Fairbanks is in the interior of Alaska where very low temperatures are the rule in the winter. The plan calls for obtaining water from wells located about two miles from the city and pumping it heating it with steam boilers before distribution. Water at 38 deg. F. is necessary. Preliminary plans have been prepared by the Kansas City engineering firm of Black & Veatch.

FEA mission to Ethiopia due home with report on needs of country

Engineers will report to Emperor Haille Selassie on country's needs for improving its economic structure; construction program would provide work for U. S. engineers and contractors.

The mission sent by the Federal Economic Administration to Ethiopia some ago is due to return to the United tes in December. If the program prepared to recommend is carried by the Ethiopian government, it is ected that engineers and contractors this country will be called upon to the construction work involved, acding to Alex Taub, chief FEA engier.

The mission, which was headed by A's assistant chief engineer, Perry E. llows, went to Ethiopia at the reest of Emperor Haille Selassie, to ke a thorough investigation, and to ort to the government on what is ded to develop the country's natural ources, improve sanitary conditions, and industry, and raise the economic el in general.

Toward this end, the commission has n investigating the need for roads. er, coal and other mining, agricul- l development, means of bettering lic health, and the need for sanitary jects. While it is expected that eners and contractors from this coun- would be in demand to carry out proposed construction program, e is no thought of sending any labor, er, perhaps, than a few skilled men, work on any of the projects that ht be programmed. Considerable ipment, though, would be needed ch United States firms would be in osition to furnish.

No charge for FEA service

his country is making no charge to iopia for the services of the FEA ion. It is expected, however, that United States would benefit through le, upon expansion of the other coun- general economy. Among the ral resources which could be deped and with which Ethiopia could for imports are gold, gypsum, lead, aster, and other non-ferrous metals. r. Fellows, who heads the commis- received his training in civil engiing at the University of Michigan. was formerly city engineer for De- , and has served the federal govent in various engineering capaci- over a period of nine years, during of which he was director of engiing for the Works Progress Admintion.

he Ethiopian mission is FEA's only non-war mission abroad. FEA engineers in South America, Mr. Taub says, are there for the purpose of finding materials to be used in the conduct of the war. Other missions are in liberated areas, where the only construction that may be undertaken is that which will further the relief program. (*ENR, vol.* p. 530, April 20) FEA is not eligible to go into such areas until six months after the military has taken over.

. . .

Better transportation for Latin America

The Office of Inter-American Affairs announced recently that it has raised its transportation division to the status of a department because of the increasing importance of cooperating with the other American republics in keeping transportation systems operating efficiently, Maj. Gen. Julian L. Schley, who was director of the former division, has been made head of the new department and named assistant coordinator.

General Schley

General Schley served as governor of the Panama Canal Zone from 1932 to 1936 and as Chief of Engineers, U. S. Army, from 1937 to 1941. Previous to that, he was commander of the 307th Regiment of Engineers in the First World War and later was commandant of the Engineer School at Fort Belvoir.

U. S. technicians employed

The transportation program of the Office of Inter-American Affairs is designed to help improve transportation facilities in the other American republics by furnishing the services of technicians to advise on maintenance and operational methods. This work is carried on in collaboration with the U. S. State Department, War Shipping Administration, Civil Aeronautics Administration, Office of Defense Transportation, Foreign Economic Administration and other agencies.

The most extensive transportation program so far undertaken has been the cooperative rehabilitation of the National Railways of Mexico. Under this program upwards of 1,000 Mexican National Railways mechanics will be brought to the United States this year for extensive railroad training. United States railway missions have been sent also to Bolivia, Ecuador and Colombia, while highway transportation surveys have been made by United States technicians in Mexico, Central America, Peru, Colombia and Venezuela.

. . .

Chicago engineer board approves two new bridges

Plans for postwar construction of two new bridges over the north branch of the Chicago River have been approved by the engineering board of review of Chicago, according to Oscar E. Hewitt, commissioner of public works.

A double-leaf bascule bridge is planned for the river crossing at Fullerton Ave. Each leaf will be 50 ft. in length carrying a single deck, 44-ft. width roadway and two 11-ft. sidewalks. Estimated cost is $900,000.

Two crossings are planned at Diversey Parkway; the north bridge to connect Diversey Parkway and Diversey Ave., and the south one to connect Diversey Parkway and Logan Boulevard.

The present 38-ft. roadway bascule bridge at Grand Ave. will be used for the south crossing, which will carry eastbound traffic only. It will be floated by barge to the new site and erected on new substructures, at a total cost, including approaches, of $860,000. A new and larger bridge will be built at Grand Ave.

The north structure at Diversey Parkway will follow the same general design as that proposed for the Fullerton Ave. bridge, except that its roadway will be 33-ft. wide for 3 lanes of westbound traffic. Estimated cost of this bridge is $1,140,000.

Prior to the war, plans had been completed for fixed bridges at both Fullerton Ave. and Diversey Parkway. Shipbuilding activities located upstream, however, prevented the obtaining of governmental approval for fixed bridges at those locations.

Preliminary plans for the two new movable bridges are well under way and construction will be started as soon after the war as plans can be completed and material priorities obtained.

Designs for the new structure are being prepared by Stephen J. Michuda, bridge engineer, Department of Public Works, under the supervision of W. W. DeBerard, city engineer of Chicago.

News of the Engineering Schools

William E. Stanley, formerly professor of sanitary engineering at Cornell University, and well known as a consulting sanitary engineer, has been appointed professor in charge of sanitary engineering courses in the department of civil and sanitary engineering at the Massachusetts Institute of Technology. Professor Stanley recently returned from North Africa where he served as a major in the Corps of Engineers and had assignments as water supply officer for seven months during the North African invasion and the Tunisian campaign, and as chief of construction in the Service of Supply for eight months.

The appointment of Professor Stanley is part of a plan to expand the program in sanitary engineering to meet the anticipated postwar demand for sanitary engineers in the development of public health facilities, the abatement of stream pollution, the operation of water and sewage treatment plants and the treatment of industrial wastes.

Professor Stanley took his undergraduate work at Kansas State College, receiving the degree of bachelor of science in civil engineering in 1912, and he did graduate work at Purdue, where he specialized in hydraulic engineering, receiving the degree of civil engineer in 1916.

Professor Stanley was teaching assistant and instructor in hydraulics at Purdue from 1913 to 1917, leaving to enter the first officers training camp of World War I, in which he was first lieutenant and captain in the Corps of Engineers, serving two years in the A. E. F. with Combat Engineers and as an instructor in the Second Corps Engineering School. Returning in 1919, Professor Stanley went with Pearse and Greeley, now Greeley & Hansen, of Chicago, working on the design, construction and operation of many water and sewerage projects.

A special 2-year course in engineering construction and contracting has been added to the curriculum of the Missouri School of Mines and Metallurgy at Rolla, Mo.

The purpose of this course is to train returning veterans, displaced war workers, and others, for field and office employment with private contractors and private or public engineering organizations. It includes the following subjects:

(1) Fundamental sciences, including mathematics, physics, and mechanics.

(2) Actual training in surveying, drafting, and materials testing.

(3) Engineering law, contracts, and specifications.

(4) Construction methods, costs and estimates, job planning, construction and equipment and performance.

(5) Elementary structural design, foundations and earthwork, materials of construction.

(6) Transportation, engineering economy, and accounting.

Lyman A. Emerson, on Sept. 16 was named assistant dean of Cornell University's engineering college. He has been a member of the engineering factulty since 1938.

William F. M. Longwell has joined the faculty of the civil engineering department of the Worcester Polytechnic Institute, Worcester, Mass. He was graduated from West Point in 1923 and later earned his degree of bachelor of civil engineering at the State University of Iowa and his master of engineering at Yale University. He was assigned to the Second New York and the Puerto Rica districts as assistant district engineer, U. S. Army Engineers, retiring in 1941 with the rank of major. For two years he taught in the Engineer Officer Training Corps at New York University and Virginia Polytechnic Institute.

Samuel H. Hopper, assistant professor of sanitary engineering at the University of North Carolina, Chapel Hill, N. C., has resigned to become associated with the United States Public Health Service.

"Highways and Airports: Design, Construction and Maintenance", and "Industrial Training", are the titles of two postwar technical courses set up by the department of civil engineering of Bucknell University, Lewisbury, Pa. D. M. Griffith, chairman of the department says:

"These courses are two years in length, and the entrance requirements are the same as for regular engineering students at Bucknell. The work of the courses will be of college level. A student desiring to change from one of these courses to one leading to a bachelor of science degree in engineering may do so without much loss of time or credit."

Bucknell is participating in the Navy V-12 Program with a trainee enrollment on the campus of 600. Among the faculty members of Bucknell who are on leave in the armed forces is Harmer A. Weeden, of the civil engineering department, an ensign in the Navy.

A study of the hydrology of the Wisconsin River Valley has been commenced. The purpose is to make possible the complete utilization of the river and to conserve soil. The study is a cooperative undertaking backed by interested organizations, including: The engineering and the agricultural experiment stations of the University of Wisconsin, the Wisconsin Valley Improvement Co., the U. S. Soil Conservation Service, and the U. S. Weather Bureau. A joint committee, under the chairmanship of Arno R. Lenz, associate professor of civil engineer at Wisconsin, is directing the investigations.

• • •

Military tractor demand to remain high in 1945

Military demand for tracklaying tractors will remain high in 1945 even if European hostilities cease, the Tracklaying Tractor Industry Advisory Committee has been told by War Production Board officials.

Combined estimated military and civilian demand for 1945 still exceeds the industry's total production capacity, WPB officials said. From present indications, no Class I tractors (the heaviest type) and very few tractors in Class II through V will be available for general contractor use. Approximately 85 percent of tractors in Classes I through IV are now going to the military.

In view of this situation, the committee recommended that Order L-53 controlling the distribution of tractors, be retained after the close of the European phase of the war until such time as requirements and production are more evenly balanced. The committee also recommended that the order controlling repair parts, L-53-a, should be relaxed when conditions warrant such action, but that it should not be revoked immediately. The order now requires manufacturers to ship up to 65 percent of their production of repair parts for military use, if the military places orders for them.

The tractor industry will not have to face reconversion problems, it was pointed out, since it has been supplying for war use the same types of tractors it produces in peacetime.

A $40,000,000 freeway proposed for Baltimore

Construction of a sunken expressway ross Baltimore, Md., along the line Franklin and Orleans streets, at an imated cost of $40,360,000 is recom- ded as the solution of the city's ffic problem in a report by a group consulting engineers headed by Rob- Moses, park commissioner of New rk City.

The report, for which Baltimore is to y $50,000, was made public on Oct. by Mayor Theodore R. McKeldin, d it has started considerable discus- n inasmuch as there is some doubt as the means of financing the project. ere are many advocates of a bridge tunnel crossing of the harbor as an rnative solution of the city's through- ffic problem. Mr. Moses, however, ys that there is no planning, juris- ctional or financial conflict between two plans.

The consultants recommend that the y finance half the cost of the express- y and that the balance be financed t of federal and state funds. The y would use a $20,000,000 loan for hway improvements authorized by Legislature last spring to pay for share. Half of this authorization, 0,000,000, is to be voted on at the vember election.

The expressway, providing six lanes traffic between landscaped slopes, uld extend from a point on the south- stern boundary where the proposed ashington expressway is to enter the y, and thence northwest to Franklin The route would swing northward d extend along Centre St. to St. Paul to avoid the Pratt Library, the thedral and other structures. From Paul St. a new viaduct would carry highway to Aisquith St., where it uld bend and continue along the e of Orleans St. to the Philadelphia d and thence to eastern city line.

Approximately 25 percent of the perty acquired would be for park recreation purposes.

A breakdown of the cost of the ex- way by the engineers fixes the perty acquisition outlay at $19,000,- Demolition of property is estimated about $875,000 and grading and inage, $2,500,000.

Paving is figured at about $2,000,000 viaducts and bridge structures at ut $9,000,000. The cost of retaining ctures is put at about $1,500,000 alteration to existing structures at ut $880,000.

Lighting installations would cost ut $675,000 and street work and ection of traffic about $1,500,000. dscaping and recreation areas are mated at $1,470,000.

Court ruling favors monopoly of AFL union

The U. S. Circuit Court of Appeals Oct. 14 ruled that the Sherman anti-trust law may not be applied to end the monopolistic practices in the New York area of Local 3, International Brotherhood of Electrical Workers, AFL. Culminating nine years of litigation by the nation's leading electrical manufacturers to break the union's monopoly, the court's decision follows the precedents established by the U. S. Supreme Court in recent similar cases. The Circuit Court agreed with the plaintiff's contention that the union followed monopolistic methods by creating an effective boycott against the products of concerns with which it has no contractual relations. However, the court ruled that it "seems likely to be less costly to stable social institutions than judicial attempts to resolve these problems without the aid of, if not contrary to, legislative direction".

The new ruling reverses a finding in October, 1941, by John Kirkland Clark, a special master appointed by the U. S. Federal District Court at New York four years previously (*ENR* Oct. 9, 1941, p. 472). At that time Mr. Clark declared that a conspiracy between the union and local electrical contractors and manufacturers had added millions of dollars to the cost of public and private electrical construction work within New York City.

New Construction Bureau is set up by WPB

A new Central Bureau has been set up by the War Production Board which not only centralizes the handling of construction contractors' problems, but will also be the means of promoting construction work, as soon as material and manpower become available. Known as the construction bureau, the new setup is headed by Arthur J. McComb of Montclair, N. J., formerly director of the Office of Industry Advisory Committees.

The bureau replaces the following existing WPB divisions: building materials, construction machinery, plumbing and heating, and the various divisions of the Facilities Bureau except those which are being abolished altogether.

Contractors will continue to apply to that WPB operating division which has jurisdiction over their particular field, just as they have in the past, but the new bureau will eliminate the former necessity of their dealing with separate WPB divisions. A bureau requirements committee is being established to pass on all construction requirements, programs, and projects. Appeals from its decisions can be taken to the central requirements committee of WPB.

Mr. McComb is being succeeded as director of the Office of Industry Advisory Committees by the former deputy director, Josiah G. Fort.

JOBS OF THE WEEK

PERSONNEL STRUCTURES, Port Chicago, Calif.

MacDonald & Kahn, Inc., San Francisco, Calif., will construct personnel structures at Inland Storage Area, Naval Magazine for Bureau of Yards & Docks, Navy Department, Washington, D. C., at cost of $1,636,361.

CARBON BLACK PLANT, Sun Ray, Tex.

United Engineers & Constructors Inc., Philadelphia, Pa., have been awarded a contract to design and construct a carbon black plant for Continental Carbon Co. The estimated cost is $1,200,000.

STORAGE FACILITIES, San Diego, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for additional covered storage facilities at Naval Repair Base, to Gorelnik Co., Los Angeles, Calif., at cost of $654,846.

ROAD, New Jersey

Fred Berlanti & Son, Harrison, N. J., has been awarded a contract by the New Jersey State Highway Department, Trenton, for improving 1.593 miles of Route 24, Phillipsburg Toll Bridge Plaza, at $699,048.

ROADS, Virginia

Virginia State Highway Department, Richmond, awarded a contract for concrete paving 4.5 miles and constructing four bridges on U. S. Route 1, south of Fredericksburg, Spotsylvania County, to E. W. Hechler, Richmond, at $518,874. J. H. Walker, Fredericksburg is the district engineer.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 237.

OBITUARY

Macy G. Thompson, 55, assistant Federal Public Housing engineer in the Portland, Ore., area, died Oct. 7. A native of Muncie, Ind., Mr. Thompson practiced architecture in Indianapolis for 24 years before going to the Portland area two years ago.

Albert Sidney Lyon, 68, superintendent of public works at Rocky Mount, N. C., for 12 years until his retirement in 1941, died at Oxford, N. C., Oct. 11. A graduate of the North Carolina State College School of Engineering, Lyon went to Rocky Mount in 1904 and served as superintendent of the municipal light and water plants until 1929 when he was made superintendent of public works and city purchasing agent.

Edward E. Blomgren, 55, district engineer for the Michigan State Highway Department, died Oct. 11 in Kalamazoo. Mr. Blomgren was graduated from the University of Michigan College of Engineering in 1916. Prior to joining the highway department, he had been employed as engineer by the Wayne and the Washtenaw, Mich., County road commissions, had worked as planning engineer for the Ford Motor Co., had been plant engineer for Nash Motors in Milwaukee, and had been resident engineer for the Illinois highway department. He was appointed maintenance engineer for the Michigan highway department in 1933, and in 1938 became district engineer in charge of the southwestern counties of Michigan.

James Alexander Ferguson, 81, former superintendent of streets at Cambridge, Mass., died recently in that city. He was born in Nova Scotia and entered the employ of Cambridge in 1887. After serving in World War I as a lieutenant in the ordnance department, he became state road inspector in New Hampshire, retiring in 1934.

Albert F. Longval, 54, construction superintendent for the Southern New England Construction Co., Hartford, Conn., for the last 24 years, died Sept. 28. In Hartford he supervised the construction of the Buckeley High School, Temple Beth Israel Synagogue, a 16-story department store addition for G. Fox & Co., and also a 134-apartment housing project for New Britain. An important achievement which gained wide attention, was his moving of a 10-story annex of the Brown-Thompson Co. store in downtown Hartford a distance of about 110 feet.

Andrew Ness, 62, owner-operator of the Ness Construction Co., Houston, Tex., died Sept. 28. Mr. Ness had been active in construction work for 33 years.

Harry Hearn Watters, 48, of Wilmington, N. C., formerly a surveying engineer at Durham, N. C., and later connected with projects at Fort Bragg, N. C., and Wilmington, died at Oteen, N. C., Oct. 8.

Earl B. Horner, 62, engineer of Burlington, N. C., died Oct. 8. Mr. Horner was connected with the Virginia Bridge and Iron Co. He was a past president of the North Carolina League of Municipalities, and a former member of the North Carolina Local Government Commission.

Marvin N. Leventhal, 48, for 34 years associated with Wesco Co. paving contractors as its president, died at Chattanooga, Tenn., recently.

News of the Week
Continued on p. 143

WEEKLY CONSTRUCTION SUMMARY

CONTRACTS

Continental U. S. Only
(Thousands of Dollars)

	Week Ending Oct. 21 1943	Oct. 12 1944	Oct. 19 1944
Federal	$40,216	$45,473	$11,101
State & Municipal	8,206	6,806	5,297
Total public	$48,422	$52,279	$16,398
Total private	7,333	5,400	4,414
TOTAL	$50,755	$57,679	$20,812
Cumulative 1944	(42 weeks)		$1,484,582
1943	(42 weeks)		$2,649,767

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1943 42 Weeks	Cumulative 1944 42 Weeks
NON-FEDERAL	$288,756	$367,821
Corp. Securities	18,228	96,970
State & Mun.	104,850	129,911
RFC Loans	14,545	57,940
FPHA Loans	3,133	
REA Loans	20,000	20,000
Fed.-Aid Hwy	128,000	63,000
FEDERAL	$2,753,838	$1,263,800
TOTAL CAPITAL	$3,042,594	$1,631,621

ENR INDEX NUMBERS

Index base=100		1913	1926
Construction Cost	Oct. '44	301.06	144.72
Building Cost	Oct. '44	236.00	127.57
Volume	Sept. '44	85.	87.

MEETINGS

National

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS, annual meeting, Hotel Lafayette, Lexington, Ky., Oct. 30-31.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, annual meeting, Atlantic City, N. J., Oct. 31-Nov. 2.

CANADIAN INSTITUTE OF SEWAGE AND SANITATION, annual convention, Royal York Hotel, Toronto, Ont., Canada, Nov. 2-3.

THE PRODUCERS' COUNCIL, INC., 21st semi-annual meeting, Hotel Roosevelt, New York, N. Y., Nov. 27-29.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Netherland Plaza Hotel, Cincinnati, Ohio, Nov. 27-30.

CONFERENCE ON INDUSTRIAL WASTE UTILIZATION, sponsored by the Sanitary Engineering Department, School of Civil Engineering and Engineering Mechanics, Purdue University, and other organizations of the state, Purdue University, Lafayette, Ind., Nov. 29-30.

Regional and Local

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA, 5th annual water conference, William Penn Hotel, Pittsburgh, Pa., Oct. 30-31.

CAROLINA BRANCH, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 24th annual meeting, Carolina Hotel, Southern Pines, N. C., Oct. 30-31.

NEW JERSEY SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Hotel Madison, Atlantic City, N. J., Nov. 24.

FOUR-STATES SECTION, AMERICAN WATER WORKS ASSOCIATION, wartime conference jointly with the PENNSYLVANIA WATER WORKS OPERATORS' ASSOCIATION, Benjamin Franklin Hotel, Philadelphia, Pa., Nov. 8-10.

ILLINOIS WATER PLANT OPERATORS' ASSOCIATION, annual convention, Leland Hotel, Springfield, Ill., Nov. 9.

VIRGINIA SECTION, AMERICAN WATER WORKS ASSOCIATION, John Marshall Hotel, Richmond, Va., Nov. 14-15.

SOUTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE, annual meeting, Lincoln Hotel, Watertown, S. D., Nov. 14-15.

FLORIDA SECTION, AMERICAN WATER WORKS ASSOCIATION, Suwannee Hotel, St. Petersburg, Fla., Nov. 16-18.

ILLINOIS SEWAGE OPERATORS' ASSOCIATION, annual conference, Leland Hotel, Springfield, Ill., Nov. 28-29.

Cancellation

NORTH CAROLINA SECTION, AMERICAN WATER WORKS ASSOCIATION and the North Carolina SEWAGE WORKS ASSOCIATION have cancelled their annual meeting scheduled for Nov. 14, 1944, in Durham.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Compromise With Conscience

Sir: If engineers are to live up to their reputed standards of integrity, generally understood by the public, they must look at all projects from a "worth while angle" as well as a technical possibility, and refuse to push forward and lend their names to projects which, while quite feasible structurally and providing work both for engineers and construction men, are economically unsound.

Mr. Torkelson's article (*ENR* Aug. 1944 vol. p. 235) is particularly pertinent along this line, as is also the editorial in the same issue on the same subject. It is very easy for engineers to aid in the proposed munificent public works spending, but in many cases they will do it at the expense of their integrity.

Fewer unsound proposals for public expenditures would go through the legislative branches if the politicians or promoters were not able to say "Our engineers approve it". What they fail to say is that the engineers said that structurally they could be built for certain sums, with no comment whatever on the economics.

All real engineers enjoy putting through a good job under difficult conditions, and the temptation is often great to overlook the "worth-while-ness" consideration. If, however, our profession is to remain one looked up to for honesty and facts, we must keep away from the usual legal attitude, which seems to be "My point of view must be flexed to suit the case and increase my income."

GEORGE R. WADLEIGH
Hastings-on-Hudson, New York

Consultant for Phelps Dodge

Sir: Inadvertently, when preparing the manuscript of "Support for a Tall Stack on Poor Soil," published in *Engineering News-Record*, Sept. 21, 1944, p. 350, I neglected to state that part of the engineering work done at the New York office of the Phelps Dodge Corporation was performed under the supervision of Wilbur Jurden, consulting engineer. I wish to correct this oversight.

C. W. DUNHAM,
Associate Professor of Civil Engineering, Yale University, New Haven, Conn.

Graphical or Analytical?

Sir: In A. A. Eremin's letter (*ENR* July 27, 1944 vol. p 81) he has appropriately called attention to the use of graphics for analyzing continuous beams. Graphics are as useful for designing continuous members as for statically determinate structures. Some solutions will be simpler by graphical means, some by analytical methods and some by a combination of the two.

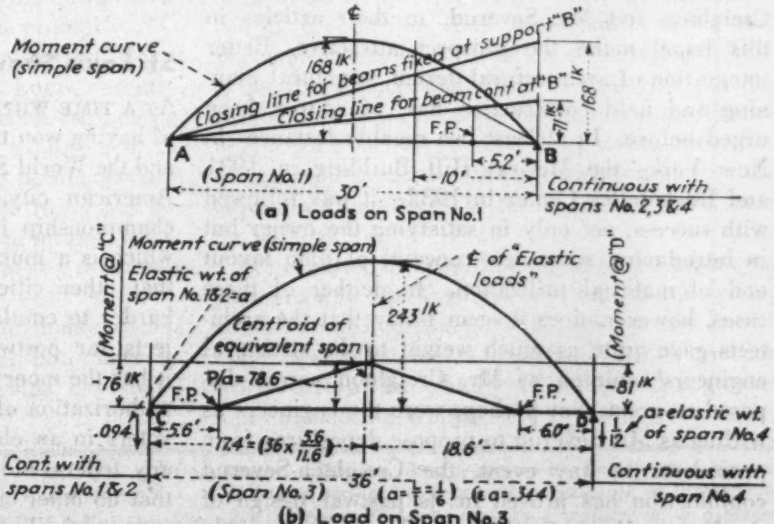
Mr. Eremin illustrated one graphical procedure, using "three line polygons" for the four span continuous beam shown in the writer's article "Bending Moments Distributed Directly By Utilizing End Rotation Constants" (*ENR* Jan. 13, 1944 vol. p. 36). There are, of course, other interesting and brief graphical constructions for solving continuous beams. The accompanying sketch (a) shows the solution for the same beam with only the end span loaded. The construction for interior spans is quite similar. The graphical methods given by Dr. Steinman in his recent articles in *Engineering News-Record* are also most illuminating.

Since the fixed points are in reality the kern points of the span when the elastic weights of the adjoining span are included at the supports, it follows from the "column analogy" that end moments may be obtained for loads on this span just as bearing pressures are found by the use of the kern points. Sketch (b) shows the solution for loads on span No. 3.

Mr. Eremin has referred to the fixed points as "inflection points." This seems inadvisable to the writer, as the inflection points, being points of zero moment, vary with the condition of loading, whereas the location of the fixed points is independent of the loading, being fixed solely by the properties of the members.

Any comparison between graphical and analytical procedures for distributing fixed end moments should properly include the work required to obtain the fixed points since their location must be determined beforehand for a solution with the graphics. In selecting a method of design one is influenced greatly by the accuracy of the results, the brevity and simplicity of the application, and the feasibility of visualizing the action of the structure; but in the final analysis individual preference will be the controlling factor. However, regardless of personal choice, a good knowledge of graphics will prove worth while.

M. W. ROSENSTEIN
Chicago, Ill.



Graphical solutions for a four span continuous beam.

EDITORIALS

VOLUME 133 NUMBER 16

October 19, 1944

What Did We Learn?

AFTER every great or new experience there comes a time for reflection and self analysis. Did we learn anything? Is it useful? Such a time is at hand insofar as the great war construction program of the past three years is concerned. The designs that departed from precedent now can be singled out and studied. The practices made necessary by the unusual conditions of wartime can be evaluated and graded. These are the facts without which design decisions for postwar projects will be inconclusive and perhaps mistaken. They are facts which we can supply in part by making the data available and by emphasizing the designs and the practices that seem significant. Such indeed is the objective of the special section in this issue devoted to a group of articles that present some "wartime lessons for peacetime building". War is a costly business at best. We should learn from it whatever we can to keep that cost at a minimum.

Integrated Building

IT IS HEARTENING to note that at least one architect and one engineer found the mandatory cooperative working arrangements of wartime sufficiently productive, pleasant and promising to warrant their continuance on peacetime building design. Moreover, not only by precept but by example, both Mr. Creighton and Mr. Severud, in their articles in this issue, make the prospect attractive. Better integration of architectural design, structural planning and field construction has, of course, been urged before. In at least two notable instances in New York—the McGraw-Hill Building in 1931 and Rockefeller Center in 1932—it was followed with success, not only in satisfying the owner but in introducing some new concepts of plan layout and of material utilization. In neither of these cases, however, does it seem likely that the architects gave quite as much weight to the structural engineers' opinion as Mr. Creighton seems disposed to grant. Nor perhaps were the engineers as willing as Mr. Severud to propose departures from precedent. In any event, the Creighton-Severud combination has proved in its postwar design of the Nurses Home for Bellevue Hospital that integrated building planning is eminently practicable. It is to be hoped that other architects and engineers will follow their lead.

Prosaic but Practical

WHENEVER a city water main breaks, and hours elapse before a shutoff valve is located, with resulting property damage, transportation tie-ups and other inconveniences caused by the rampage of uncontrolled water, the public can properly question the competence of municipal engineers. A recent experience in New York City typifies a situation all too common in our major cities: Some 16 hours elapsed after a break in a 36-in. main was discovered before a valve could be located and shut; in addition to subway flooding, street and sewer destruction, an estimated $10,000 damage was caused by the inundation of a hospital basement. Since breaks in mains are a logical and frequent expectation, why is it that water supply engineers are so ill-prepared to cope with such contingencies? A partial explanation may be that our older distribution systems were inadequately valved when first installed and that it is too expensive to make changes now. However, that excuse does not explain why it requires hours to find the location of a valve when an emergency does occur. The answer—obvious even to a layman—is that the engineers have failed to provide themselves with a valve location map. For this there can be little excuse—not even the cost—since the damages from a single major break would go a long way to defray the expense of providing maps. All this suggests that when water department engineers draft their postwar plans, they include the long-neglected, prosaic but practical item of valve-map making.

St. Louis Shows the Way

AT A TIME WHEN ST. LOUIS is basking in the glory of having won two major league baseball pennants and the World Series, and is thus the envy of every American city, she can also claim a national championship in postwar public works planning, which is a much more substantial honor and one that other cities might, likewise, covet and try harder to emulate. St. Louis not only has its projects for postwar construction under design, but it has the money to pay for them. It got it through authorization of a $43,500,000 bond issue by the voters in an election on Aug. 1. It got it without any federal-aid strings attached. And now it finds that no other city in the country is anywhere near it in amount of bonds voted, and indeed that it

issue represents about 40 percent of all the postwar bond issues approved by U. S. municipal voters. It is an achievement deserving high praise, attained by methods that other cities should know about.

St. Louis began by preparing a list of needed postwar projects to compare with the funds that could be made available, which totaled 55 million dollars, including a 35 million dollar addition to the city's bonded indebtedness. The initial project list totaled over 150 million dollars, calling for some drastic pruning.

The weeding-out process was done by a group of high city officials who reduced the list to 165 projects whose total cost was within the 55 million dollar budget. Then the significant action occurred: A large committee of outstanding citizens was appointed to investigate the program and report its conclusions. Divided into 11 subcommittees, corresponding to the same number of main groups of projects, these civic leaders visited every site, analyzed every job and conferred with others and among themselves. Their first report was adverse on some projects, but favored new ones, so that the total cost became 63 instead of 55 million dollars. But by refining and cutting, they finally came up with a $43,500,000 program to be submitted to the voters.

There was no doubt of the outcome. With most of the city's outstanding citizens and many of its civic and business organizations in favor of and actively supporting the postwar public works plan, the average voter was convinced he wasn't being hoodwinked. As a consequence he voted in favor of the measure, 5 to 1.

St. Louis, however, is not resting on this financial victory, but is rapidly pushing the design of its projects so that bids can be taken promptly. "To do this", said Milton M. Kinsey, president, Board of Public Service of the City of St. Louis, recently, "we intend to utilize all of the private engineering and architectural talent which is available in St. Louis, in addition to those on the public payroll. It is a gigantic task, but we will be ready and we are proud that we have a tangible program [whose financing is authorized] while others are merely talking."

Few other municipal officials can make such a forthright statement. That should not, however, be true for long, now that St. Louis has shown the way.

Renewing Contact with French Engineers

AN UNUSUAL GROUP OF ENGINEERS sat down to dinner in New York not long ago to discuss problems of mutual interest. Except for a mere handful, all of the more than one hundred present had been born in France and educated in the engineering schools of that country. In part they were men like André Fouilhoux, noted engineer and architect of New York, who had come to this country in his younger days and had decided to stay, but in larger measure they were men who had come here on official business for France before or in the early days of the war. Denied the opportunity to return to their own country, they had worked for her indirectly by working for us, as for example, the president of the group, Pierre Aubert, and one of the world's foremost authorities on the heat treatment of steel, who has contributed materially to our airplane program.

The group has been meeting quietly for some time past. At this meeting, however, there was a new spirit. France was again free, and plans were being made for revival of her industries. There was full recognition of the magnitude of the task, and especially of the fact that engineers in France have been cut off from engineering developments for four years. They, more than any other class of French citizen, need to be brought up to date, if France is to recover as quickly as she should from the effect of the war.

Here is a condition that should be of concern to American engineers, to our engineering societies and to our technical journals. Ways must be found to make the developments of the past five years known to French engineers. Their files of our society transactions and technical journals will need to be completed, but it would be well if we could, in addition, find some more direct and personal way to help. Creation of traveling fellowships for French engineers to visit this country would be one way, or we might invite the French engineering societies to send delegates to our engineering society meetings as our guests and with the expenses encountered in the necessary travel paid by us.

What better use could be made of the assets our societies now are laying away than to revive and stimulate an interchange of experience and knowledge with the engineers of France? It is a question worth careful thought by all American engineers and engineering groups.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* Copyright, 1944, by McGraw-Hill Publishing Company, Inc.
EDWARD J. CLEARY, *Managing Editor*. *New York:* V. T. BOUGHTON, A. N. CARTER, H. W. HUNT, E. R. DENMARK. *Chicago:* H. W. RICHARDSON, L. R. CARR. *Washington:* PAUL WOOTON, CHARLOTTE DuBOIS, *San Francisco:* N. A. BOWERS. *Consulting Editors:* F. E. SCHMITT, W. W. DeBERARD
EDITORIAL OFFICES: 330 WEST FORTY-SECOND STREET, NEW YORK, N. Y.

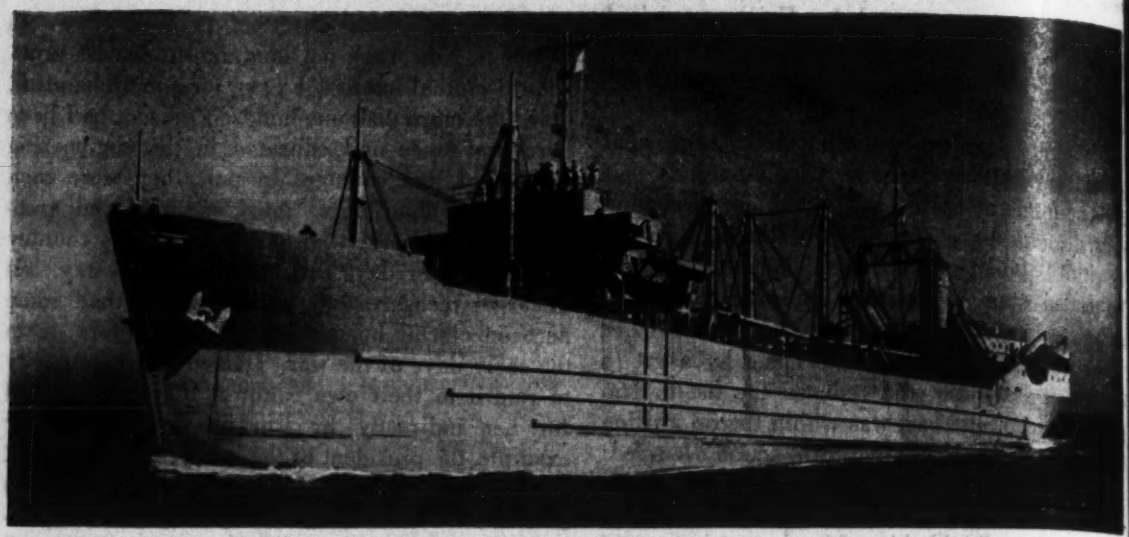


Fig. 1. One of 26 powered concrete ships being used to carry vital cargo to Allied battle fronts. Capacity is 4,400 tons.

Powered Concrete Ships of World War II

Robert E. McLaughlin
Chief Engineer, McCloskey & Co.
Tampa, Florida

***Contents in Brief**—Basic design information on concrete ships is presented with a descripton of the methods used in building the only powered concrete ships produced in this country on other than an experimental basis, in 25 years. The ships have thin walls and were built with light-weight aggregate. Forms for the hull bottoms were permanently attached to the basin in which the ships were built. Outside forms of plywood and inside ones generally of steel, were arranged so that concrete could be placed in 2-ft. lifts.*

CONCRETE SHIPS have proven effective for the emergency gap they were designed to fill. Several of them are serving successfully as wartime cargo carriers while many of the concrete barges, started earlier in the shipping program, have gone to all parts of the world. This is in decided contrast to concrete ships of World War I when none of the vessels were completed until several months after the war and some were never used.

TABLE I—MAXIMUM STRESSES PERMITTED IN CONCRETE SHIP DESIGN, INCLUDING COMBINED STRESSES OCCURRING SIMULTANEOUSLY

Concrete, ultimate compressive strength	5,000 psi.
Compression in concrete	2,250 psi.
Shear—Hull girder (with no steel reinforcement for shear)	100 psi.
Shear—Hull Girder (with steel reinforcement for excess of shear over 100 psi)	200 psi.
Shear—Hull girder (with steel reinforcement for entire shear)	500 psi.
Shear—Beams, Frames, & slabs (without steel reinforcement for shear)	150 psi.
Shear—Beams and frames (with steel reinforcement over 150 psi.)	300 psi.
Shear—Beams and frames (with steel reinforcement for entire shear)	500 psi.
Bond—For plain bars.	160 psi.
Bond—For deformed bars.	200 psi.
Compression in steel.	16,000 psi.
Tension (in steel between the inner and outer faces of shell below load water line and bottom slab)	12,000 psi.
Tension (in steel in deck slab)	16,000 psi.
Tension (in stirrup steel in beams and frames)	16,000 psi.
Tension, elsewhere.	20,000 psi.

Twenty-six self-propelled concrete ships have been constructed in the current U. S. Maritime Commission program, all built at Tampa, Fla., by McCloskey & Co. These are moderately large vessels, 350 ft. between perpendiculars, 366 ft. overall, 54 ft. molded width, and 36 ft. deep at the centerline amidships with a 1-ft. deck camber. Loaded draft is 26 ft. 3 in. at a displacement of 10,950 long tons of which 4,400 tons is useful load-carrying capacity. A 1,300-hp. triple-expansion, reciprocating steam engine drives the ship at a little more than 10 knots.

For dry cargo

The concrete ships are fully equipped, have accommodations for a crew of 39, cargo handling machinery and some defensive armament. There is only a single deck over most of the vessel and no longitudinal bulkheads so that space for cargo is large and unobstructed. Ten transverse bulkheads divide the vessel into seven dry cargo holds, deep tanks for fuel oil, a combined boiler and engine room,

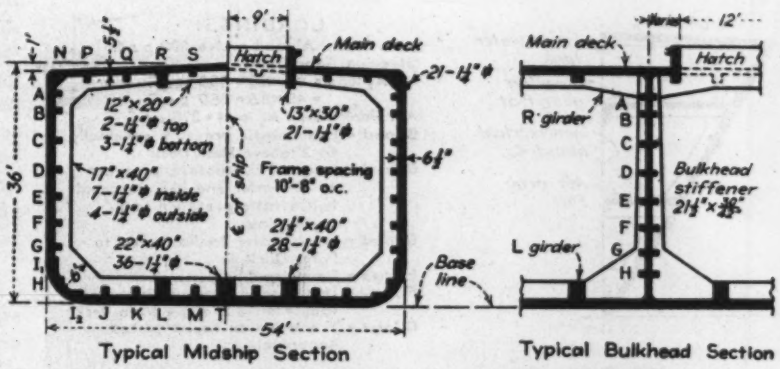


Fig. 2. Cargo spaces are unobstructed for 30 ft. length by 50 ft. wide.

e peak and an after peak. Double m construction is not used but tanks for water ballast are pro- abreast one of the cargo holds.

Design is difficult

he ship is designed as a hull er for hogging and sagging es, based on the trochoidal wave ry, and for other local hydro- ic and live load conditions. De- assumptions and the general ing of frames, bulkheads and ger beams were determined by requirements of the American eau of Shipping and the U. S. ritime Commission. Rigid-frame lysis is used for design through- the entire structure. The loading ditions indicated in Fig. 4 give e idea of the scope of the struc- l problems in the design of mem- s for combined bending and direct sses due to local loads plus the ct of hogging and sagging.

The hogging stresses, which cause sion in the main deck steel, are en as acting on the main deck out- e of the *R* girders plus the side ll down to and including the *A* ngers, shown in Fig. 2. No steel ween the *R* girders on either side the centerline is considered as tak- hogging stresses because the 18-ft. e hatch opening in the deck in- rupts the structural continuity. ging stresses, which cause ten- in the bottom shell and keelson, taken as acting up to the top of bilge.

For design of steel ships, the classi- tion societies, such as Lloyd's and American Bureau of Shipping, e compiled rules and regulations erning scantling sizes for differ- types and sizes of steel ships. No ctives of this sort have been com- d for reinforced concrete ships, making it necessary for the struc- l engineers to design the entire structure. The Hardy Cross method of column analogy was used extensively in the design of the midship frames. In design of the after-peak frames, the Portland Cement Association curves were found most useful for haunched members. All computations and designs of the McCloskey & Company engineers were checked by the engineers of the U. S. Maritime Commission, Washington, and the American Bureau of Shipping, New York.

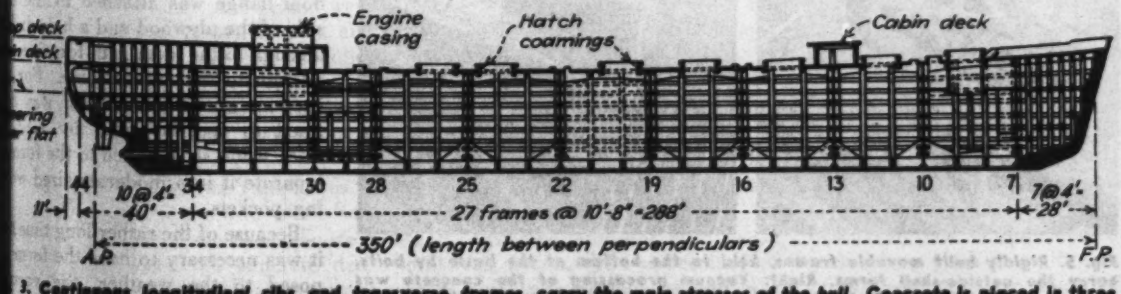
Low weight is a most important consideration in any ship design. To keep the weight of the concrete as low as possible, the minimum thickness of concrete protection consistent with safe practice for salt water conditions, is provided over the reinforcing steel. Outside face of the shell has $\frac{3}{4}$ in. and the main deck $\frac{3}{4}$ in. of concrete over the steel. In all other positions a $\frac{1}{2}$-in. minimum cover is specified.

Shell thickness is $6\frac{1}{2}$ in. reinforced with two layers of $\frac{3}{4}$-in. dia. plain bars and two horizontal layers of 1-in. dia. plain bars. Bar spacing varies with the intensity of hydrostatic pressure and the hull-girder shear. Stringers, $6\frac{1}{2}$ in. wide and 18 to 20 in. deep, spaced about 4 ft. c. to c., span frame to frame and extend the entire periphery of the shell. Transverse frames are spaced 10 ft. 8 in. c. to c., throughout the midship portion from forward to aft collision bulkhead. Forward of the forward collision bulkhead and aft of the aft collision bulkhead frames are 4 ft. c. to c.

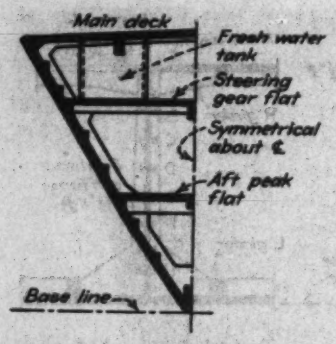
Rigid frame design

Transverse frames are designed as rigid frames spanning between the *R* and *N* girders on the main deck and thence down to the side keelson *L* and the center keelson *T* taking into account the rigidity of the bilge. The *R* girder and the *L* and *T* keelson are designed as rigid frames spanning from bulkhead to bulkhead and supporting the intermediate frame.

Main deck slab is $5\frac{1}{2}$ in. thick with $1\frac{1}{4}$-in. square deformed bars longitudinally, spaced 4 in. c. to c., both top and bottom, but staggered, for the portion outboard of the *R* girders. Inboard of the *R* girders, $\frac{1}{2}$-in. dia. plain bars longitudinally spaced 5 in. c. to c., top and bottom staggered, are used. Steel transversely in the deck consists of $\frac{1}{2}$-in. dia. plain bars spaced 8 in. c. to c. at top and 10 in. c. to c. at the bottom. Additional $\frac{1}{2}$-in. dia. plain bars are placed at the intersection of the main deck and the side shell and are lapped 40



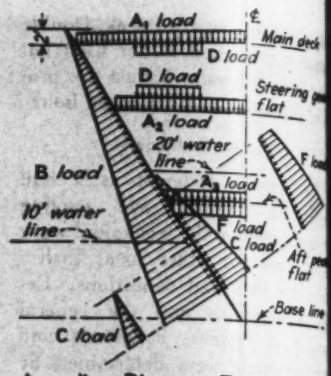
3. Continuous longitudinal ribs and transverse frames carry the main stresses of the hull. Concrete is placed in three principal pours, to the 6-ft. water-line, to just below the deck and then the deck.



Aft Peak Frame No. 36

LOADINGS:

Main Deck: A_1 load = Live, 200 p.s.f.
Steering Gear Flat:
A_2 load = 64 × 8.5 = 550 p.s.f.
= 45 × 8.5 = 380 p.s.f.
Aft Peak Flat: A_3 load = 270 p.s.f.
B load = Hydrostatic pressure externally to 2' above Main Deck
C load = Internal hydrostatic pressure to 20' water line plus external hydrostatic pressure to 10' water line
D load = Fresh water tanks tested to Poop Deck
E load = Dead load only
F load = Hydrostatic pressure below Aft Peak Flat to 2' above Main Deck
G load = Fresh water tanks tested separately



Loading Diagram Frame No. 36

Fig. 4. Stresses at a frame near the stern of the concrete ship. Loadings are computed separately to determine maximum shears, moments and direct stresses.

diameters to assure continuity to shell and deck steel. Main deck beams, 6½ x 14 in., are spaced at about 6-ft. centers and span from frame to frame for full continuity.

At the McCloskey Hookers Point yard near Tampa, Fla., the concrete ships are constructed three at a time in each of three concrete basins 1,200 ft. long, 82 ft. wide and 26 ft. deep. The basins (*ENR* July 15, 1943, p. 152) have the forms for the bottom of the ship attached permanently to the floor and stripping is done by floating the vessel to raise it off the form. Plywood was used for the first vessel, nailed to transverse wood strips embedded in the concrete. Some difficulty was anticipated as it was expected that some of the plywood might adhere to the concrete and then roll up under the ship as it was moved out of the basin, but this did not occur.

However, during the long construction period while side forms, reinforcing and other work was under way, the plywood was alternately wet and subjected to the Florida sun and considerable abrasion. This caused some surface defects. For subsequent vessels the bottom forms were made of narrow width, 1 in. nominal thickness D&CM (dressed and center matched) cypress boards up to the top of the bilge.

Forms for the sides of the concrete ships were built in sections just a little narrower than the 10 ft. 8 in. spacing of the frames of the ship. Vertical members of the supporting falsework were 3 x 10 and 3 x 8-in. timbers where 2-in. lumber gave the theoretical strength needed. The added thickness was used to give stability and rigidity, since it was expected that most of the frames would have to be set out of the basin while the ships were floated out. These frames were diagonally and horizontally braced with all joints bolted. Horizontal 2 x 10-in. timbers at 4 ft. c. to c. carried vertical 2 x 6-in. studs at 16 in. c. to c., bolted on with 2 x ½-in. angles. Plywood, ¾ in. thick, was used for the face of the exterior forms.

Originally, the vacuum process of removing excess water from the concrete was planned for these ships. The outside forms were built to act as vacuum mats; ¾-in. thick plywood being used, covered with an expanded metal lath, then 30 mesh to the inch screen wire covered with 10-ounce duck, rather closely woven. At regular intervals on the form a threaded floor-flange was attached to the outside of the plywood and a hole drilled through to the metal lath for pipe connection to the vacuum line. For the vacuum operation, suction was confined to specific areas by a ¼-in. thick wood strip nailed to the form to separate it into moderate sized working pockets.

Because of the rather long time that it was necessary to have the forms exposed to the weather, the vacuum process did not prove entirely satis-

Fig. 5. Rigidly built movable frames, held to the bottom of the basin by bolts, carry the outside-shell forms. Right: Vacuum processing of the concrete was used on the ships built first. Plywood forms covered with metal lath, 30 mesh screen wire and cloth make a continuous vacuum mat of the side shell.

factory. The fabric held the moisture so that the surface of the plywood was subject to both moisture and heat. The operation of placing large prefabricated sections of reinforcing damaged the cloth and the screen under it. Thus when concreting was undertaken, minor defects appeared in the surface of the concrete ships. Forms used in the later construction were ¾-in. plywood with no lining.

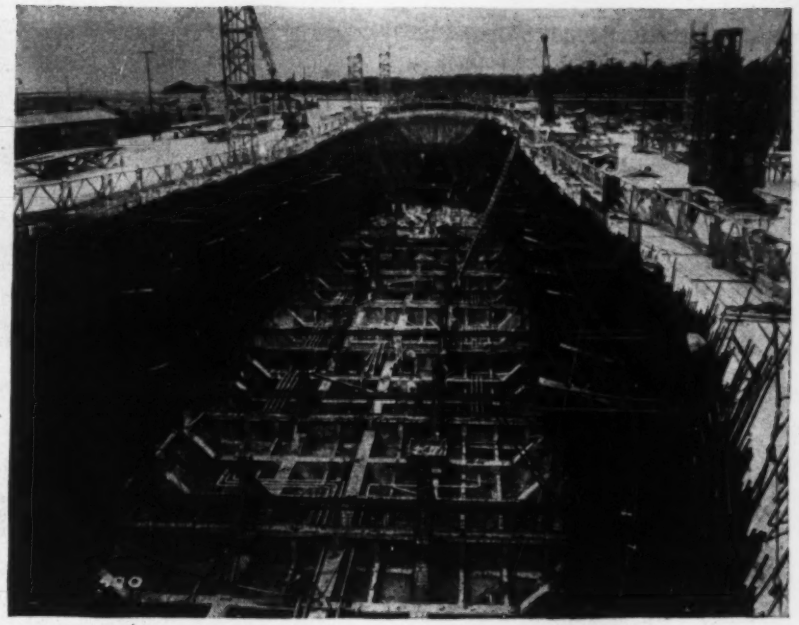
Reinforcing preassembled

Reinforcing steel for the entire vessel was very carefully detailed in the job drafting room prior to fabrication to insure that the bars meet the many angles and curves that are a necessary part of this type ship. Templates of all the frames, stringers, beams, girders, bulkheads and deck members were built to full size on the mold-loft floor and the proper shapes and clearances worked out. This required many man-hours of coordinated work in the drafting room but resulted in substantial overall economy. Timber jigs were erected on which sections of the reinforcing were accurately fabricated, tied and welded into a rigid member and then set in one piece. When construction started, beams were assembled for the entire width of the ship into preassembled sections weighing as much as three tons and set in one piece. After a trial the size of some of the preassembled sections was reduced, due to the difficulty of threading the main longitudinal bars through the assembled sections.

All reinforcing steel was required to be placed exactly in accordance with detail drawings as the very thin concrete cover over the bars permitted little tolerance. Rigid inspection by Maritime Commission and Bureau of Shipping Inspectors assured that the hull steel was in its proper position before concreting started.

Reinforcing steel came to the job in 60 ft.-lengths. Longitudinal bars for the shell, deck slab and girder were flash welded into 300-ft. lengths and then handled into the ship on roller conveyors through an opening left in the stern. It was placed for the bottom and complete side shell prior to placing any inside forms.

Construction plan at Tampa was to pour the vessel to the 6-ft. water line, then to just below the deck, the deck itself and finally the concrete deck house and miscellaneous structures



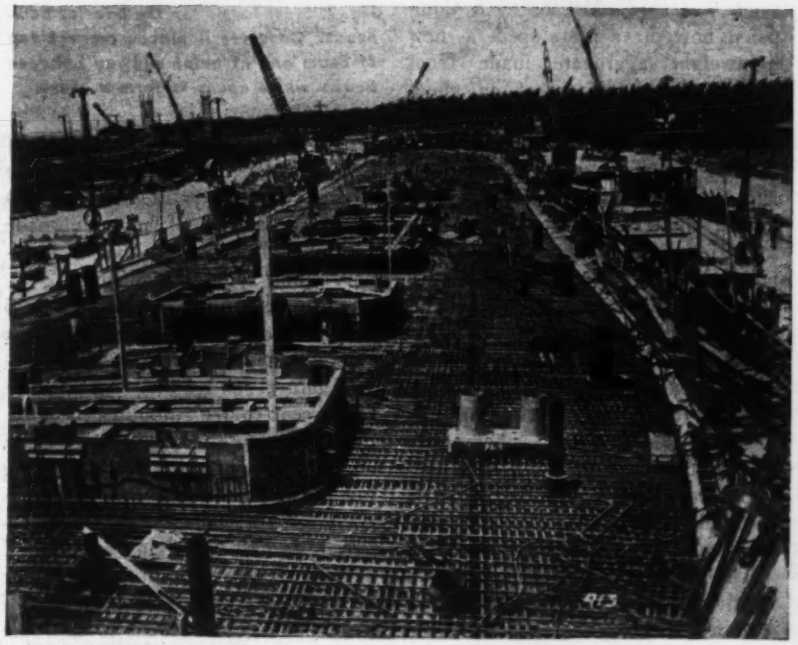


Fig. 6. (Above) First pour completed showing bottom framing of ship and (below) deck steel in place ready for concrete. Note that hatches break the continuity of the center third of the vessel.

above. Wood forms were used for the beams and the start of the bulkhead for the first pour.

Inside form for the side shell was assembled in one unit for the full height of the second pour and set in position in one piece. Forms for the interior bulkheads were metal and were placed in panels between the shell stringers and the horizontal bulkhead beams. The upper half of each panel was removable and was left open until the concrete floor reached the level of the opening. By placing concrete alternately through the open top of the beams, at 4-ft. centers, and removable open section, it was possible to avoid honeycomb in the 4-in. thick bulkhead and obtain a dense and watertight concrete.

The inside forms were held to the outside by ties of the rolled-coil type with a long pitch screw-thread on the bolt. These ties were placed through

wales that form the side of horizontal beams and stringers of the permanent concrete, thus preventing leakage of water that might occur if ties were placed where the walls were only a few inches thick. For further protection a washer was swaged on the tie to add another obstacle to water passage.

The metal forms have been used for 24 of the 26 ships constructed at Tampa. While original cost was high, use of the metal forms has proven most economical.

New lightweight aggregate

To reduce the weight of the concrete ship further than was possible by decreasing the thickness of the wall, lightweight aggregate was used for the concrete. For the first hull, fine and coarse Haydite, a burned and crushed clay aggregate, with some sand, was used. McCloskey & Company now have developed a new lightweight aggregate made from fullers earth obtained at an abandoned mine near Ellenton, Fla., some 60 miles from Tampa. The newly developed material is named "Nodulite" and is manufactured by crushing, drying and grinding fullers earth, a form of volcanic clay, into a fine powder. This powder is fed into a rotating cylinder or nodulizer and sprayed with water in drops of varying sizes. The drops of water pick up varying amounts of dry material, much as rain drops do in rolling over a dusty floor. Small spheres are formed that become quite hard and these are calcined in rotary kilns, a very delicate operation, which makes them into vesiculated nodules.

The aggregates thus formed have a relatively low moisture absorption and are very light. Concrete made from this material weighs about 112 to 117 lbs. per cu. ft., and standard test cylinders show a compressive strength at 28 days of at least 6,000 psi. Workability of concrete made with Nodulite exceeds that of ordinary stone aggregate concrete.

Fig. 7. Steel forms for the interior bulkheads. Concrete is placed through top of beam and at point midway between beams which opens to form a chute.

For ships built at Tampa, 9.2 bags of portland cement were used in a cubic yard of concrete with 15 percent natural sand, 35 percent fine and 50 percent coarse Nodulites by absolute volume. Percentages were varied slightly to maintain constant grading but the cement factor was held constant. Water-cement ratio was between .45 and .50 giving a slump of 4½ to 6 in. A retardant and densifier (Plastiment) was used at the rate of ½ lb. per bag of cement to slow the initial set of the concrete, improve the workability and reduce shrinkage.

Concrete was proportioned in a plant at the shipyard and prepared in truck-mounted mixers that hauled to any part of the building basin. Concrete was lifted to the deck level by a crane, using a 1½-cu. yd. bucket for delivery to master containers. The latter were located at about the third point in each hull. From the transfer hoppers concrete was taken in two-wheel buggies along a temporary platform and dumped through elephant-trunk chutes for delivery where required. A semaphore system was used to control the quantity of concrete to be deposited at each of several points throughout the ship. External form vibrators were spaced about 6 ft. c. to c. each way and internal mechanical vibrators were inserted into each batch as it was deposited to insure a dense concrete.

Three ships launched at one time

When three ships were ready for launching, water was allowed to enter the basin through stop log gaps on each side of a floatable concrete gate at the river end of the individual basin. When the water was equalized the water ballast in the gate structure was pumped out so that it floated. The gate was towed out of the way, to be returned later and sunk to position, with the aid of a diver, after the vessels were floated out.

Ships were taken from the building basin to a 1,200-ft. long out-fitting pier designed to accommodate six ships at one time. Here the deck machinery, such as king posts, cargo-booms, winches and anchor handling equipment were placed and the wood joiner work of the superstructure and installation of piping and other equipment were completed.

When outfitting was nearly finished, the ships were taken individually into a graving dock 520 ft. long, 82 ft. wide and 27 ft. deep, also made of thin section concrete. Here, for the first time, the bottom of the vessel was exposed for examination and for any repairs that might be necessary below the water line, as well as for final painting. Hydrostatic tests were performed at this stage by filling different compartments of the ship with water.

The construction part of the project has been under the personal direction of M. H. McCloskey, Jr., with Nelson Tallman superintendent.

TABLE II—CHARACTERISTICS OF LIGHT WEIGHT AGGREGATE

Total Percent Passing Standard Screens

Screen Size	30 percent coarse Nodulite	20 percent medium Nodulite	35 percent fine Nodulite	15 percent natural Sand
½ In.	85-100			
⅜ In.	30-70	90-100		
4	0-15	30-60	95-100	
8		0-15		
16			45-80	95-100
50			10-30	20-40
100			5-15	0-10
Specific Gravity	1.16-1.37	1.23-1.56	.65-1.89	2.62
Dry loose weight cu.ft.	39-42	43-47	55-62	98-102
Absorption, percent	5-12	5-12	2-12	0.2-0.6

Fig. 1. Standard 20-ft. sections of precision fabricated steel are used to make a 40-ft. span portable railroad bridge.

Portable Railway Bridges Precision Built

Robert J. Wood
Assistant Chief Engineer
Mississippi Valley Structural Steel Co.
St. Louis, Mo.

***Contents in Brief**—To replace bomb-wrecked railroad bridges in England in a hurry, British Army Engineers developed a simple, portable, sectional, bolt and pin-connected bridge that could easily be adapted to spans from 15 to 85 ft., to narrow or standard gage track, and to deck or through type construction. So successful was the design that it has now been assigned to combat service, adopted by the U. S. Army and produced in this country as well as England. Its manufacture requires precision fabrication far beyond that of usual structural steel work, tolerances being held to thousandths of an inch instead of sixteenths. It is known as the unit construction railway bridge and is not to be confused with the Bailey bridge used for highway traffic.*

THIS IS A WAR OF MOVEMENT. That places bridges in first order of importance on land transportation systems, to be destroyed if they belong to the enemy, to be built or replaced if they are yours.

During the historic air blitz against England the British learned the hard way that railroads must be kept rolling. Out of that bitter experience the Royal Engineers of the British Army developed a practical, portable sectional railroad bridge designed to replace wrecked structures in a hurry. Called the Unit Construction Railway Bridge, its chief characteristics are simple design, few parts, full interchangeability of members, and precision in fabrication. Shop fabricators had to learn to work to tolerances of thousandths of an inch instead of the usual sixteenths permitted on most steel structures.

The ideal combat bridge would be a simple structure that could be erected as easily and as quickly as throwing a plank across a ditch. Such perfection, of course, is impossible, especially for railroad bridges which must match in alignment and grade the existing tracks on both approaches, must span various distances, must serve as either deck or through type as circumstances require, and must accommodate different track gages. Furthermore, it must be possible to erect the structure with relatively unskilled labor in fast time under unfavorable conditions of darkness, bad weather and enemy action. All of these requirements were met by the British engineers in their Unit Construction Bridge.

The design is a simple Pratt truss in sections 15 and 20 ft. long, made up of either two or three 5-ft. panels and two half-panels. Sections can be assembled into any span length in multiples of 5 ft. from 15 to 85 ft. Each section of truss includes two identical chord members (top and bottom), vertical web members at every panel point, diagonal web members which can be inclined either direction, chord splice plates, and an assembled end post unit for the end section. Two or four trusses are used for through-type structures, while deck spans can be made up of two or three trusses. When assembled, the chords are 6 ft. 10 in. back to back. The design also permits erection as skew spans with one or two-panel skews.

Each top and bottom chord consists of a $\frac{1}{2}$x18-in. cover plate and two $\frac{5}{8}$x13$\frac{3}{4}$-in. side plates, all either 15 or 20 ft. long, welded into a channel section with $\frac{1}{2}$-in. diaphragm spreaders placed at mid panel points. Web members, both diagonal and vertical, are 14-in. H-beams with the web cut out and re-welded into a section 10 in. deep to fit exactly inside the chord side plates. Working points of the panel intersections do not fall, as is customary in bridge design, within the center of gravity of the chords, but intersect outside the chords, thus eliminating the usual gusset plates for

Fig. 2. Display assembly showing various possible arrangements of trusses. A-B: Two-truss through span. B-C: Two-truss deck span. D: Floorbeam for through span. E: Stringers set below floorbeams. F: Stringers set on top of floorbeams. G: Bracing for deck truss. Not shown are four-truss through span and three-truss deck span.

the connections of chords, vertical and diagonal web members. All web units fasten directly to the chord side plates. End posts consist of a welded assembly of three vertical members connected by a central longitudinal diaphragm and top and bottom side plates, all fitting inside the chord side plates.

Truss sections are fastened together with several splice plates. The various members—chords, web units, end posts and splices—are assembled by means of 1-in. bolts or 1⅛-in. drift pins turned down to close tolerance for a snug fit into drilled holes. These pins are upset at one end into a head and are tapered at the other end for driving. A holding pin fits through the tapered end. Except for two bolts for pull-up, bolts are used in the assembly only when they are in direct tension, otherwise the pins are used. The close fit of the pins is indicated by a requirement that all holes in the top chord not used in assembly shall be filled with drift pins for 15 ft. on each side of the center of span to develop full cross-section of metal. Pins are driven and extracted with a special tool and hammers.

For two-truss deck span assembly the trusses, spaced 5 ft. 2 in. apart, are braced with cross-angles and top and bottom tie angles at every panel point, and also with a top and bottom lateral angle bracing. For three-truss deck spans, the trusses, set 3 ft. apart, are held by two sets of cross bracing, but the lateral and tie systems are combined into stiff bent plates bolted to the chords at top and bottom panel points. Track ties are carried on the top chord cover plates, held in place by hook bolts.

In the two-truss through spans the trusses are set 12½ ft. apart, connected by 27-in. floor beams at panel points, and bottom lateral bracing of angles. The track is carried on 10-in. H-beam stringers. Connections between floor beams and stringers permit the stringers to be placed in five positions; either on top of the floor beams or dropped lower to frame into the floor beams, and spaced for 3-ft., motor or standard gage track. Where four trusses are required for through span assembly, an additional truss is placed outside of each of those on the two-truss arrangement, fastened only by a connecting set of vertical web members.

All structural members are comparatively light, requiring only the simplest of erection equipment. Weights of principal members, units and spans are given in the accompanying table.

The British started out building the bridges for replacement of bomb-

WEIGHT OF MEMBERS AND SPANS OF RAILWAY BRIDGE

Chord, 15-ft.	1,690 lb.
Chord, 20-ft.	2,264
End post assembly	1,085
Web vertical	288
Web diagonal	314
Floor beam	1,189
Stringer	160

Total wt. one truss

Span 55 ft.	11.9 tons
" 60	12.7
" 65	14.2
" 75	16.1
" 85	18.4

Total wt. bridge
Two-girder through type

Span 55 ft.	36.6 tons
" 60	39.4
" 65	43.7
Span 75	49.8 tons
" 85	57.0

Four-girder through type

Span 75 ft.	88.4 tons
" 80	93.3
" 85	101.2

Two-girder deck

Span 55 ft.	27.7 tons
" 65	33.2
" 75	35.3
" 85	37.6

Three-girder deck

Span 75 ft.	58.0 tons
" 80	61.2
" 85	64.5

ged structures in England, but long they were produced for t service also. Later the U. S. adopted the design, and the Allies set up a big program to these bridges to all the fight- reas throughout the world. This am, far too large for British to handle alone, threw part of oduction into the United States. expedite that program, Lt. Col. Everall, of the British Royal neers, came over to this country the British plans and worked the staff of Lt. Col. Clayton E. ins and Howard H. Mullins of Engineer Board of the War De- ent. The Engineer Board re- the British plans to American ards, and later a contract was let e Mississippi Valley Structural Co., with plants at St. Louis, Decatur and Melrose Park, Ill. is contract was different from large scale project ever under- n by an American steel fabricator. uracy was imperative, as any ge part made by this company be interchangeable not only all similar parts made by n, but also with all similar parts e in Great Britain. This meant rances measured in thousandths of inch, in contrast to the ☆-in. tol- ce to which structural steel fabri- rs have been accustomed. To k to the new machine tolerances materials as variable as rolled shapes, and yet to produce hun- ds of identical parts at assembly speed was the kernel of the pro- tion problem.

Special welding and drilling jigs

Mississippi Valley engineers and duction men met the difficulty by igning special welding and drilling , accomplished in some instances rebuilding existing machinery. To speed and power of structural steel p equipment was added carefully igned and accurately built jigs and tures which, in effect, changed sim- machinery into precision machine ls.

Since the allowable tolerances were close, it was necessary to make a mplete detailed study of all fabricat- g operations before developing the lding and drilling jigs. Poorly de- ned welding jigs or improper weld- g sequence would almost certainly sult in misalignment and warpage. lso the use of the drilling jigs had to be coordinated with the drilling equipment available to achieve speed of operation, accurate hole location and true hole size. Each machine and each jig presented an individual problem.

Most of the work was sub-punched or sub-drilled and then drilled to exact size, but some of it was drilled full size from the solid metal within the permissible tolerances. To drill the large chord members, one multiple drill originally designed and used for fabricating heavy columns for skyscrapers was provided with a precision-built jib and self-aligning carriage to hold the work. The result was a machine which drills 22 holes at a time from the solid metal and still maintains allowable tolerances of minus 0.000, and plus 0.008 in. in diameter.

For the end posts, approximately $4\frac{1}{2}$x$6\frac{1}{2}$ ft., a box or "coffin" jig was designed, which permits single drilling of the 168 holes per piece at the almost unbelievable rate of 400 holes per hr. The drill is home made, but the measured results are well within the allowable limits.

Fig. 3. Details of floor beam, stringer and end post framing. Note the tapered connecting pins.

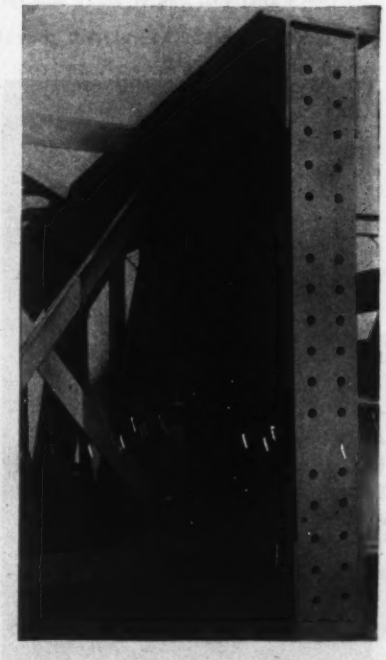


Fig. 4. Simple bracing for deck truss framing. For three-truss deck spans the trusses are set closer together and rigid bent plates replace top and bottom lateral bracing system.

Each plant has special assignment

In developing the production program and designing equipment, our three plants work as a unit. To assure maximum production and minimum duplication, all chord members and incidental details were assigned to one plant; all web members and floor beams to another; and all end posts, stringers and miscellaneous detail items to the third. All three plants had in common the basic problem of accurate drilling as to size of hole and location. In addition, each plant encountered special problems, and was free to solve them independently by

designing jigs and fixtures to fit its own machines.

In all preliminaries of planning and tool design, British methods and procedures were deliberately "locked out" in order to give full reign to new ideas. Later, these British methods were studied to take advantage of their manufacturing experience wherever it was possible. The British had produced about 50 of these bridges in several of their shops, including railroad and machine shops. Their me produced work of good quality were not suitable for the high necessary to meet our Army's sch for deliveries.

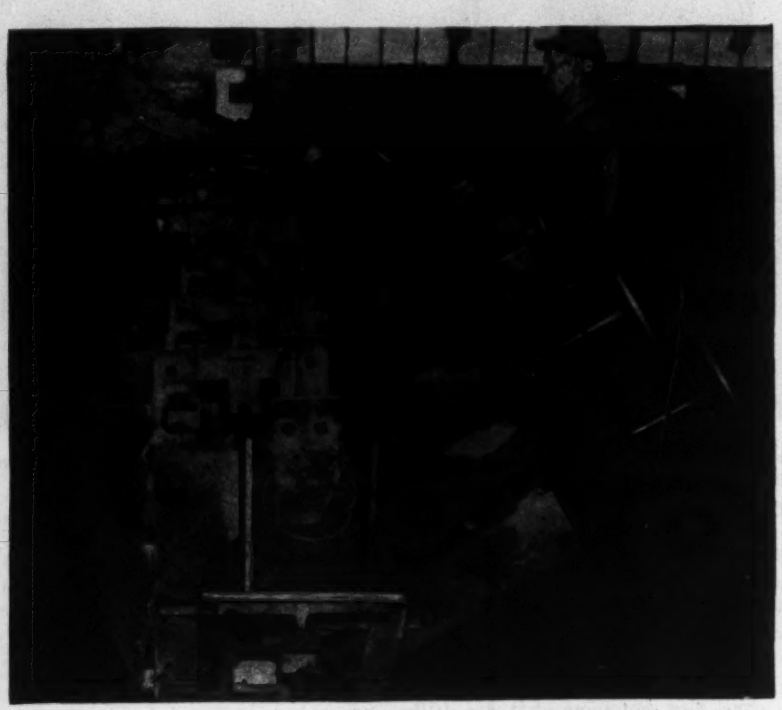


Fig. 5. Special jig for assembling and welding chord sections, one of many special tools designed for precision fabrication.

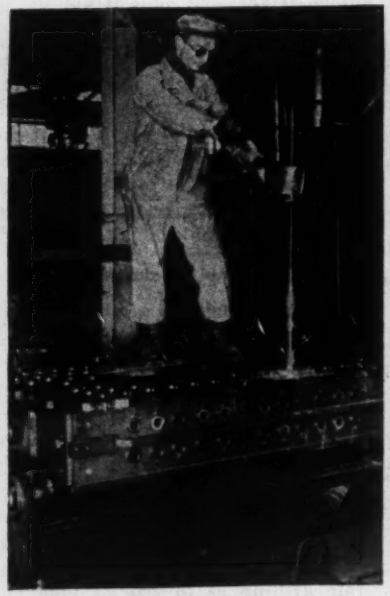


Fig. 6. Automotive type drill jigs, fitted with bushings and liners for accurate work, hold the sections for close-tolerance drilling. Left: Coffin or box jig for drilling end post assemblies. Right: Drilling a chord cover plate.

In place of British practice of paratively light-weight jigs and ings without liners, Mississippi V installed heavy jigs of the type in the automotive industry, equipped with accurate bushing liners. To reduce assembly time minimum, the edges of a numb plates and parts were machine suring rapid and accurate assem the various parts in the welding This also reduced the shrinkage warpage from welding and spe up the entire program.

Trial assemblies proved succes

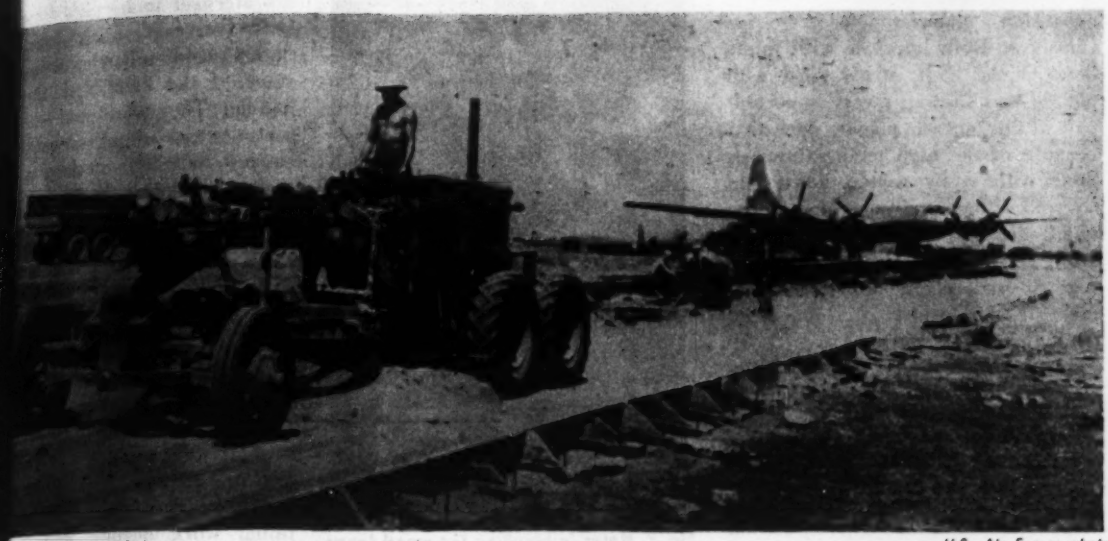
Immediately upon completion jigs and equipment, production begun and bridge parts m through the plants with steadily creasing speed. As soon as the units were completed, trial assem were made of both type spans. P were found to be readily interch able with virtually perfect fit. A British units, shipped in for the pose, were assembled into test sp and fitted with Mississippi Va members as though made on the s machines by the same men.

This job is a good example American and British collaborati of effective pooling of ingenuity ideas to hasten victory. It also dem strates the resourcefulness typical American industry, in adapting in for faster fabrication of produ formerly produced by older, slo methods of craftsmanship.

Direction

Direction and inspection for U. S. Army were handled by the Louis District Office, Corps of En neers, in charge of Col. L. B. Feag who was assisted by Capt. P. N. A lock, chief of the production secti and Harry N. Taylor, chief inspect of fabrication.

For Mississippi Valley Structur Steel Co., J. B. Butler, vice presid and manager of the St. Louis pla and E. T. Blix, chief engineer of t Melrose Park plant, worked out t program of fabrication. The coo dination of production and engine ing was in charge of R. J. Wood a sistant chief engineer of the Mapl wood plant at St. Louis.



U.S. Air Forces photo

Fig. 1. Job made forms were used to build runways in India for Super-fortresses.

Bases for B-29's Built by Engineer GI's

[E]ditor's Note—Bases for B-29's, the superfortress bombers, were built in [I]ndia by U. S. Aviation Engineer troops. Most of the work was extension of [e]xisting runways at existing fields but it was done with very little equipment and [d]uring the hottest season of the year. The general story of the bases was [o]btained from an interview with Maj. John J. Mattiello, "trouble-shooter" [o]n several of the fields. An accompanying article, on the concrete mixing [p]lant improvised for one of the fields was received direct from the China-[B]urma-India theater.

[A]VIATION ENGINEER TROOPS and their [n]egroes did the spade work to enable [t]he B-29 Bombers to operate from [I]ndia. According to Maj. John J. [M]attiello, former New York con-[t]ractor, the engineer GIs actually had [t]o use the spades because they lacked [c]onstruction equipment at the time [t]he bases were needed, and local labor [c]ould not stand the work.

The bases in India are needed to [s]erve as "stepping stones" in getting [o]ver the Himalaya Mountains and [a]re used regularly to bring the big [b]ombers out of range of Japanese at-[t]ack. The construction involved run-[w]ays more than a mile in length with [h]ardstandings" in the form of fig-[u]re eights along both sides of the [p]aved flight strips. Only one runway [i]s provided at each field since the pre-[v]ailing winds blow inland during the [r]ainy season and in exactly the op-[p]osite direction during the long hot and dry season. In general the work has been extension of existing runways built for medium bombers.

A large part of this region in India is covered with rice "paddys," or fields, that are under water during the monsoon season from July to October. Soil is known as moorum, a fine silt that packs very hard with a little moisture and is very nearly impervious to rain. In some areas laterite exists, a petrified material that is porous and harder than shale. Land throughout the area is generally flat and drainage is a major problem to keep water off the runways and drainage off the field. Principal grading job was digging ditches along the runways; the earth was moved by carrying-scrapers and used to raise the runway above the surrounding ground.

Moorum soil makes an excellent subbase and, when brought to optimum moisture content, it can be compacted with sheepsfoot rollers to a high density. Finishing with 10-ton smooth rollers produces a very hard surface that takes little water and can be worked on shortly after a rain. Use of moorum makes the usual subbase unnecessary and is, in itself, firm enough to carry the heavy wheel loads of the super bombers. A cover was required for preservation of the runway surface and local cement and aggregate was used for a concrete slab 8 in. thick.

Runway surfaces were built with a few 1-cu.yd. mixers set up at a central plant with concrete hauled out to the runway by dump trucks, and spread and finished entirely by hand. Aggregates were gravel or stone crushed by engineer troops. In either case the material had to be hauled several miles by narrow-gage railroad, competing with bombs and necessary items of supply for space on an overloaded transportation system. Good cement, quite finely ground and somewhat similar to the high-early cement produced in this country, is available in quantity in India. Aggregates are of rather inferior quality.

A wide variation in temperature occurs in this area—from 75 deg. F. to a one day maximum of 166 deg. This called for placing concrete in 25-ft. wide strips with a "dummy" joint

down the center, and the use of mastic expansion material placed transversely at 40-ft. intervals with joints between the 25-ft. strips filled with poured tar. Curing, a very important part of the concrete placing operation because of the high temperatures, is done with straw wetted down and covered with empty cement bags. The quick setting characteristic of the finely ground cement results in "crazing" or surface cracking if the concrete is not protected from rapid drying.

Behind the technical details of construction of the bases in India is an epic story of human endurance and fortitude. Here the situation called for rush work under conditions that normally would be unbearable. Water was a continuous problem. During the monsoon season there was water everywhere, but the rest of the year was dry, and wells 300 ft. deep were required to get even the barest supply. Construction needs had a prior claim on water, which was required for moistening the subbase, for mixing concrete and for curing.

Hot showers, sometimes

The GI's and the officers received only a single canteenful of chlorine-treated warm water, and on special occasions were allocated enough for a shower. But the shower had to be taken at night or early morning for the water passing through pipes laid in the sun was raised to boiling temperatures.

Fig. 2. Holes in blocking for wood forms were made with a pneumatic tool set in a "drill-press" made from salvaged crating.

People native to the area where the bases were constructed are not physically capable of much manual labor. Serious and continuous shortage of food, coupled with the ravages of many diseases, has left them barely able to do light work such as handling empty cement bags and assisting in curing the concrete. The best workers are said to be girls from
twelve years old. Each GI had 7
native people following around
some of the light work they
handle. They were paid with
arette or two and a little money,
since it took four of them to
sack of cement that an Ame
could throw on his shoulder with
their helpfulness was limited.

Actual building of the fields
done by aviation engineer tr
mostly recruited through the v
tary enlistment program. A
more than half of the army force
this work were white troops an
rest negro. All of the men were p
of their work and the thought of
ting the B-29s over the "hump"
Japan was incentive enough for
tinual work despite unusual h
ships.

The troops worked 10 hou
day, 7 days a week, under tem
atures of 110 deg. and up. Ce
and soil dust coupled with pri
heat, impetigo and other skin i
tions combined to make the job
that called for far more than no
physical endurance. Displaying
most superhuman efforts the tro
handled the cement, spread concr
by hand and did all manner of he
tasks in the terrific heat. They li
on canned rations since native fr
and other foods were either ina
quate or unsafe for consumption.

Fig. 3. Concrete was cured by ponding. Such protection of fresh concrete was unusually important during India's d season. On one day the thermometer reached 166 deg. in the sun—and the concrete was being placed in the sun.

A marvelous esprit de corps existed on all of the construction operations. At one field this resulted in placing 35,000 cu.yd. of concrete in one month, largely with hand labor. This operation was directed by officers who worked alongside and lived with their men. The GI's worked individually to accomplish their own portion of the work with men of all grades cooperating rather than being directed to specific tasks.

Maj. Gen. Wm. E. R. Covell, who had previously been engaged on important work in the Carribean area, is in charge of all construction as commanding general of the Service of Supply. Brig. Gen. Thomas F. Farrell, formerly of the New York Department of Public Works, is head of the engineers in the area; Col. Philip F. Kroner, Jr. is division engineer and Lieut. Col. Kenneth Madsen is district engineer directly in charge of the airport work.

Maj. Mattiello, who supplied the information to *Engineering News-Record*, was staff officer under Colonel Kroner, and trouble-shooter on the airport work. He gives all credit for accomplishments to the men from General Covell down to those who handled shovels—shovels that got too hot to pick up if they were laid down. Maj. Mattiello's voice really gets husky when he tells about the enthusiasm, the endurance and the fortitude of the boys who worked 70 and more hours a week with the sun of India burning their backs while they made airports for the big bombers to battle their way into Japan. Every man would prefer meeting the Japs face to face to merely taking the brunt of the punishment without being able to fight back. But they accept construction as their job and have been doing this job well.

BATCHING CONCRETE FOR B-29 BASES

Capt. H. E. M. Stevenson
Corps of Engineers, Engineer Aviation Battalion
China-Burma-India Theater

AN ENGINEER aviation battalion, operating under the jurisdiction of the Army Service of Supply, Construction Service, was assigned paving responsibility consisting principally of strengthening and lengthening an existing British-built medium bomber runway for use of B-29s and the construction of hardstand parking loops, or "dough-nuts".

The runway was strengthened with a 6-in. slab of Portland cement concrete, 150 ft. wide, on an existing base of crushed laterite and moorum. The extension was laid on new fill, and consisted of a 10-in. concrete slab, 150 ft. wide and 1,500 ft. in length. The parking loops were also of concrete, 10 in. thick, 60 ft. wide, with an average medial length of 600 ft.

The target (schedule) date was set for June 30, 1944. The first concrete was placed on April 19.

The problem which faced the battalion was that of mixing, transporting and placing over 80,000 cu. yd. of concrete in the relatively short time of 70 days. The problem was made further difficult in that this period fell in the heart of the "hot" season, with temperatures ranging from 110 to 145 deg. F. Finally, it was learned that no paving equipment would be available as scheduled arrival of pavers, batchers and finishers from the United States had been delayed. To further complicate the situation, the battalion's "organizational" equipment also was delayed and the initial attack on the project had to be accomplished with a minimum of equipment, mostly borrowed from meager stocks.

Equipment surveys indicated that

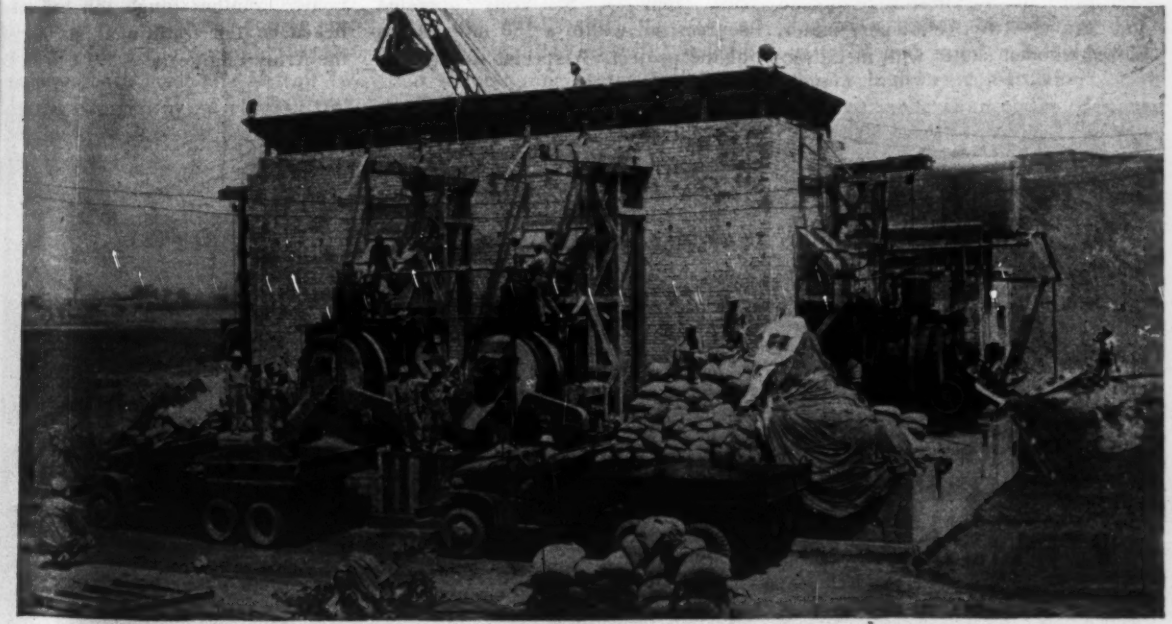


Fig. 1. Four 1-cu.yd. mixers constituted the central plant in which 80,000 cu. yd. of concrete was produced in 70 days. The plant was built around an existing brick stop butt used for "firing-in" airplane guns.

only four 1-cu. yd. skid-mounted mixers would be available from British lease-lend sources. These, together with borrowed dump trucks, had to form the mixing unit.

It was immediately apparent that some form of mechanical batching was required as hand batching, with wheelbarrows, in the high temperatures would be too slow and would soon wreck the physical strength of the battalion.

Studies of end-dump ramps, bin set-ups and the like all ended against a common, discouraging snag—lack of construction materials, metal shapes, welding equipment, and heavy timbers. The flat terrain offered no opportunity for a gravity, hill-side installation.

Batching plant details

The solution of the plant problem suddenly was simple. An existing British-built stop butt, for the firing-in of aircraft machine guns, was analyzed and found to contain the basic requirements of a simple, gravity feed plant.

The stop butt was a brick structure consisting of six cells filled with gravel and sand. The cell were 6x6 ft., 22 ft. high, and were flanked by buttressed wing-walls, as shown in Fig. 2. To accommodate the four mixers, two additional cells had to be constructed. The cells were used as overhead bins, for the storage of sand and gravel—two cells per mixer. Closed wooden chutes with metal sector strike-off gates were tapped into the bins by tunnelling through the thick brick walls. These chutes emptied into a volumetric measuring hopper equipped with bottom-dump gates, which discharged into a metal-apron-chute feeding directly into the mixer as shown in Fig. 1.

Cement was raised to the volumetric hopper by a vertical travelling, end-dump, metal skip bucket operating in a small tower. The bucket was hoisted by the power unit on the mixer that normally raised the charging skip. Mixed concrete was discharged directly into dump trucks passing along a road excavated below the mixing platform.

Cement was piled in areas between the mixers, the stock piles being kept at operating levels by trucks shuttling between cement godowns (warehouses) and the batch plant. Water was supplied to the mixers by gravity from a 2,500-gal. tank set on the back wall of the plant. This tank was filled by direct pumping from a small creek some three miles away.

The overhead bins were charged from stock piles by use of a 1½-cu. yd. crane, handling a 1¾-yd. clamshell bucket. Aggregates were stockpiled by truck, driving on the pile over mats of pierced planking. Aggregates were fed to the crane by a bulldozer operating on top of the piles.

Coarse aggregates were shipped by rail from U. S. Army operated sources, all within a 150 mile radius of the project. A special siding, five miles from the job, was constructed to handle an average of 100 cars every 24 hours. These cars were unloaded onto the ground by coolie labor, then the long windrows of aggregates were loaded into dump trucks by two ¾-yd. clamshells and one overhead loader. Sand was dug by hand from the bars of a nearby river, loaded in dump trucks and hauled 10 miles to the project. The work of excavating and loading was done by both male and female coolie labor.

The plant was placed in operation on April 19. Initial production was 111 cu. yd. per 8-hr. shift, and was increased to 605 cu. yd. by the end of the month. The job worked two shifts and, as the personnel became physically hardened and mentally accustomed to the temperamental whims of the plant, the shifts were increased to 10 hr. each. Peak production was reached on June 12 when 2,015 cu. yd. were run through the four mixers. Average production for the job was about 1,200 cu. yd. per day.

Considerable assistance was given by the British officials of the Bengal-Nagpur Railway, especially in furnishing the metal for chutes, gates and hoppers and the use of their shops.

On June 30, the target date, the last batches of concrete were delivered to remaining fillets of the runways and on July 1 the first B-29 Superfortresses flew in and took over their new home. Another tough job had been licked in the traditional manner of the Army Engineers.

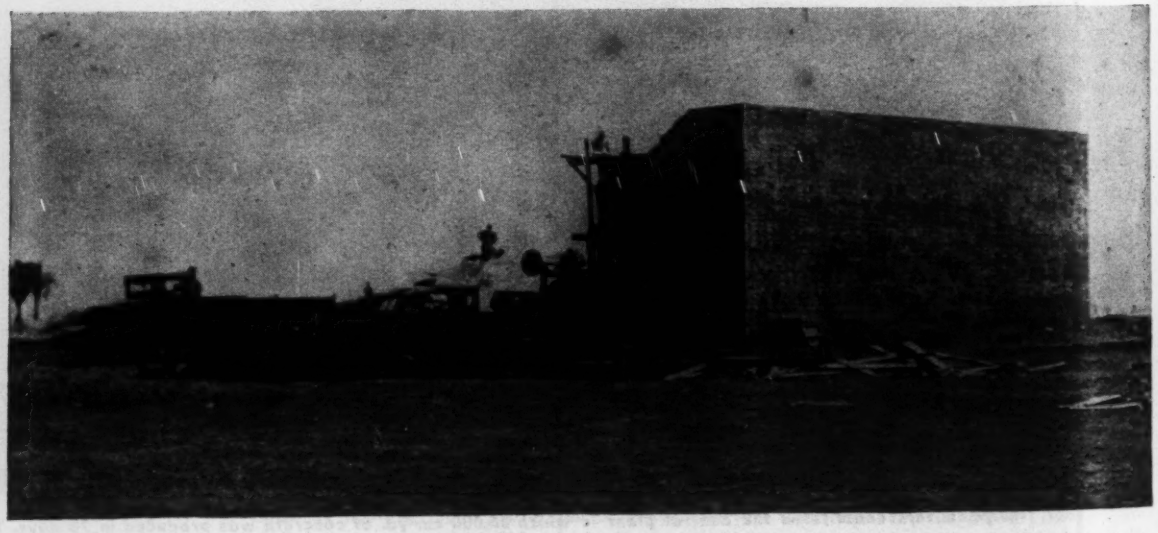


Fig. 2. Existing brick firing-in butt was remodeled to serve as a support for aggregate bins for paving in India.

Fig. 1. Generous sight distance and minimum curvature assure operation safety on the Detroit Industrial Expressway.

Detroit Expressway Built for Safety

***Contents in Brief**—Safety of operation and aesthetics of design are incorporated in the 16-mi., 4-lane divided Detroit Industrial Expressway. Large directional markers at grade interchanges insure free flow of high-speed traffic.*

BY CALLING on their vast store of knowledge in highway design, the Michigan State Highway Department engineers have made the Detroit Industrial Expressway an efficient traffic artery as well as a thing of beauty. This 16-mi., four-lane divided expressway, now serving Ford's River Rouge and Willow Run plants, is favorably located to become a part of a proposed interstate highway (*ENR* Jan. 14, 1943, vol. p. 58; and *ENR* Oct. 5, 1944 p. 409). In addition to designing it for high speed traffic both on the expressway proper and at interchange connections, careful attention was given to the aesthetics of design and location.

Cut slopes, in general, are made 1 on 3, either seeded or sodded and blended into the natural ground line at the top to give a most pleasing appearance. Gentle grades of not more than 3 percent, wide sweeping curves of 3 deg. maximum and sight distances of not less than 1,250 ft. not only provide for maximum safety but impart a feeling of security to the motorist that is often lacking in ordinary highway construction.

Interchange connections, designed for 1,200 vehicles per lane per hour, incorporate a high degree of efficient operation and they have been made foolproof for the average motorist.

Decelerating and accelerating lanes,

Fig. 2. Mounted high above the pavement, traffic markers of generous proportions can be read easily from afar.

finished with a dark colored concrete to warn the motorist of a change in traffic pace, are of ample length to permit safe and easy egress and ingress on the main arterial lanes. Lampblack was first used to color the concrete on the connecting lanes. On recent construction, however, black or yellow iron oxide is mixed into the concrete to give it color.

Large traffic signs

When high-speed traffic is resumed after the war, the most outstanding feature of the Detroit Expressway as viewed by the average motorist, probably will be the huge, easily-read directional markers located high above the pavement at strategic locations. Built of manufactured wood and natural timber to conserve critical wartime material, they will be replaced by metal signs after the war.

Reflectorized letters, 12 in. high, and a large reflectorized directional arrow, 2 ft. long by 12 in. wide are mounted on a sheet of ¾-in. pressed wood 3½ ft. high by 15 ft. long, which is set in a frame made of 4x4-in. timbers. Four strips of 2x4-in. cross-bracing on the rear of the directional signs make them sufficiently rigid in a windstorm. Each supporting post contains three pieces of 2x6-in. laminated timbers driven 5 ft. into the ground and braced with two 2x6-in. timbers. The signs are placed just outside the roadway shoulder and their tops are about 12 ft. above the pavement.

The same high type of rustic beauty and operational safety were built into the depressed cross-connecting highways as that used in the expressway proper. Roadway cuts were well seeded and blended into the ground-line at the top. Depressions were started well back from the eastbound and westbound pavements of the expressway, carried down on an easy grade, and passed beneath attractively designed reinforced concrete arch bridges of sufficient span length to provide ample sight distance.

Another example of the foresightedness of the designing engineers is to be found in the treatment of the two-lane bridges on the raised-grade section of highway. These structures, as built, provide a 24-ft. roadway flanked by 12-ft. wide concrete shoulders set 4 in. above gutter grade, with an intervening rolled curb. Cast-in-place concrete handrails are set outside of the raised portions of roadway deck. These concrete shoulders, or raised portions of deck, are not needed for sidewalks since there will be no pedestrian traffic on the highway. Rather, they were designed to make the gutter-to-gutter width of roadway on bridges match the 24-ft. approach pavement, and to keep a safe distance between vehicles and bridge handrails.

Looking far into the future, the designing engineers visualized the possible need for widening each of the present two-lane expressway pavements to carry four lanes of traffic. Accordingly, the bridges are constructed so they can be widened to a 48-ft. clear roadway between handrails by simply removing the raised concrete shoulders. The concrete slab, carrying these removable shoulders, is designed as a continuation of the regular roadway slab.

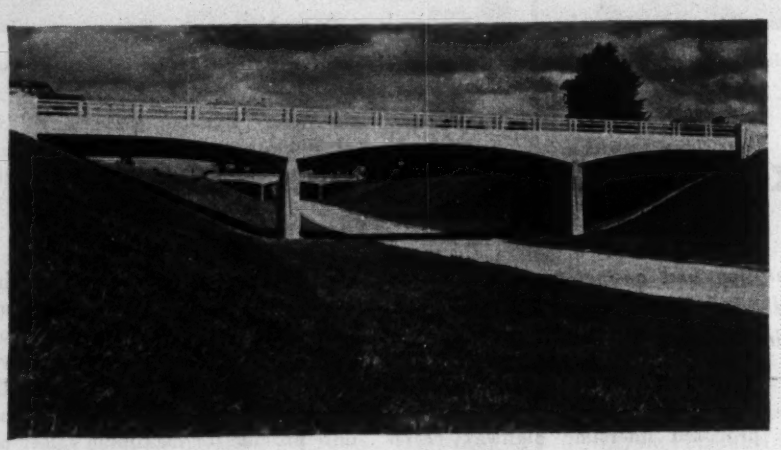


Fig. 3. Intersecting highways are overpassed by long-span bridges that provide ample visibility. Rounded side slopes are well sodded to prevent erosion.

Fig. 4. Bridge handrails are cast-in-place reinforced concrete. Bridges on the raised-grade section of expressway can be made 4-lane by removing the 9-in. rolled curbs and the 12-ft. sidewalks.

Engineering Personnel

All design and construction of the Detroit Industrial Expressway was under the direct supervision of Harry C. Coons, deputy commissioner and chief engineer. Charles M. Ziegler is commissioner of the Michigan State Highway Department and Harry T. Ward is his chief deputy. Bridge design was under the direction of James Flynn, assistant bridge engineer, and road design was by C. A. Weber, assistant road engineer. J. Carl McMonagle is the department's planning and traffic engineer, and Scott A. Baker is acting construction engineer.

Wartime Lessons For Peacetime Building

These War Buildings Were Significant 109
Postwar Effect of Emergency Specifications 119
South American Building is Challenging 121
Possibilities in Architect-Engineer Teamwork 129
Design Solutions in Synthetic Rubber Plants 135
Waterproof Parapet Wall Construction 139

These War Buildings Were Significant

WAS INEVITABLE that the war con-ction program, just because of its gnitude and urgency, would pro-e changes in building design. rtages of many materials trans-d this basic tendency to change a necessity, and the pressing need bigger and better industrial struc-s than had existed before sup-d an incentive with a patriotic e that spurred designers to exer-their ability and ingenuity to fullest extent. As a result, the program is responsible for a mber of structures that may have a nificant bearing on the future of lding design. It is the purpose this article to emphasize as many these important structures as are own to the editors and as space will rmit. And as an introduction, a opsis of the design changes that curred will provide a proper per-ective.

Demands of the aircraft manufac-rers are illustrative of the need for tter buildings. Not only did these ms frequently specify completely -conditioned buildings, but they ed for better lighting, larger areas unobstructed floor space than in the past, and, in general, more flexible layouts.

As an aid in meeting the air conditioning requirements (also for blackout purposes) many new factories were made windowless, and the walls and roof were designed to provide better insulation than did those in older factories. Measures were also taken to overcome condensation at the walls, an important factor in some manufacturing processes.

Fig. 1. Roofs for Tulsa and Ft. Worth bomber plants contain 3 in. of glass wool supported on metal lath and covered by metal deck, which in turn was covered by fiber glass board and a tar-and-gravel roof.

To satisfy the demands for more satisfactory lighting, fluorescent fixtures were used extensively, while in other structures both incandescent and mercury vapor units were installed. To improve lighting conditions further floors were built with the upper surface of white concrete, and in at least one factory indirect lighting was used, focused on a white arched ceiling.

Demands for more flexible plants were met by the use of longer roof members to permit a wider column spacing, by providing greater clearance below the roof framing, and by removing such facilities as washrooms, toilets, and cafeterias from the manufacturing floors.

Many significant buildings also resulted from the extensive use of relatively unfamiliar materials and the use of old materials in new ways. For example, when structural steel became critical, large blimp hangars,

Fig. 2. To meet demands for large areas of unobstructed floor space, 300-ft. steel roof trusses were used in a building addition at the Boeing Aircraft plant.

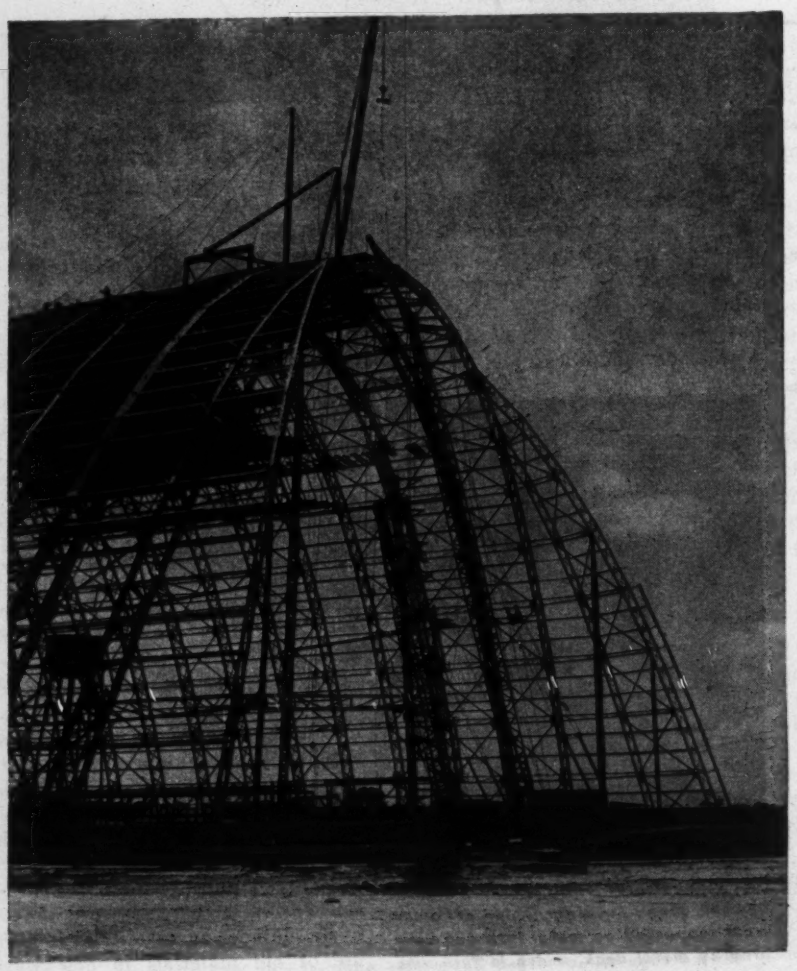


Fig. 3. Arch trusses of 328-ft. span and 185-ft. rise were required for steel blimp hangars built early in the war, which were equipped with orange-peel doors.

multi-story buildings and on
factories were constructed of
plywood girders making their
ance and laminated beams a
of long span being used. Rei
concrete was used for many bu
that would have been built o
in the past, including several
one-story plants where the reinf
steel requirements were reduce
very low figure. Other de
ments included a more extensi
of glass block and asbestos-c
siding and such substitutions a
tic flashing for copper.

Measures to meet extremely
construction schedules also pro
numerous changes over past con
tion practice. Welding, which
inated much shop fabrication,
resorted to, special reinforce
crete designs were employed to
mit more rapid shifting of the f
and on timber construction the
bers were cut and assembled
mass production basis to a far gr
degree than in the past. More pr
concrete work was done, includi
production of concrete floorb
and, in at least one case, roof ar

Unobstructed floor space

A 15-acre Boeing Aircraft
constructed early in the war prog
at Seattle was indicative of the m
ures to be followed in construc
many later manufacturing plant
meet the demand for large area
unobstructed floor space. One m
ure was to construct an elaborate
tem of wide, underground access
nels and rooms to house the toi
lunch rooms and utilities, which
moved these facilities from the m
floor and from mezzanine balcon
A second design feature was the
of long-span roof members per
ting a wide spacing of columns.
example, for a 250x450-ft. area in
Boeing factory, 125-ft. and 200
bays were used transversely, with
supporting columns being located
50-ft. centers longitudinally.

Steel trusses of 300-ft. span

As the war progressed deman
developed for still larger floor are
unobstructed by columns. A 22-ac
addition to the Boeing plant just
scribed is a case in point. Here, st
roof trusses of 300-ft. span were us
in three parallel bays. Carrying a sa
tooth roof, the trusses are set 65
apart. Because the footings for t

orting columns had to be carried
es, it was not deemed advisable
ke the three truss spans continu-
Instead, the two end spans were
as anchor spans for cantilevers
the central bay that carried a
t. suspended span.

nother plant with 300-ft. trusses,
with longitudinal spacing in-
ed to 100 ft. is that of the Fisher
eland Aircraft Division of Gen-
al Motors. Here in an area 600
quare, only 6 columns are re-
ed. This plant is also notable for
ection built of reinforced con-
e in which flat-slab bays 50 ft.
re are used, again to reduce
ructions to a minimum.

Blimp hangars of steel

Early in the war program, before
became critical, several huge
hangars were constructed to
e the Navy's coastal patrol
ps. Principal framing consists
27 steel truss arches of 328-ft.
and 185-ft. rise. Shop-welded
field riveted, the truss ribs are
ported on pinned shoes connected
w floor level by tierods. All
mbers are T-section, the chords
g halves of 12- and 15-in. H-
ms. An exception is the end ribs,
re the chords consist of U-shaped
emblies of plates, providing con-
tion for a double web system, the
reased strength of the rib being
uired to support the orange-peel
r.

Light steel hangars

For use in the war zones a light-
ght-steel, demountable hangar
imed to possess the "mobility of
circus tent" was developed by the
tler Mfg. Co. Using a three-
ged, steel arch truss of 130-ft.
n tied at the base as the principal
ming, the hangar can be erected
fairly irregular terrain, a cleverly
signed hinge bolt reducing erec-
n time to a minimum. Normally
hangar is enclosed by a flame-
oof, light-weight canvas, suspended
m the arches, but when perma-
ncy or climatic conditions dictate,
wood or steel roof can be applied.
A somewhat different all-steel de-
ountable hangar was developed by
e Armco Drainage and Metal Prod-
ts Co. Light-weight bolted arch ribs
pressed steel members provide the
incipal structural framing, a 190-
clearance being available at

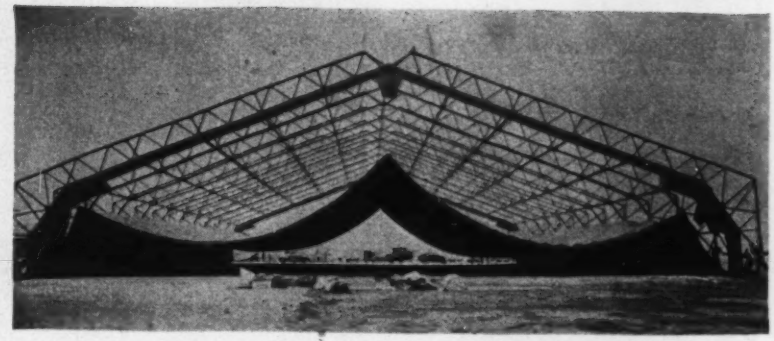


Fig. 4. Principal framing of Butler steel hangar, introduced for war use, consists of three-hinged arch trusses supporting a canvas enclosure.

Fig. 5. Armco demountable hangar has steel arch ribs covered by pressed steel channels, which are also employed to close area above the door.

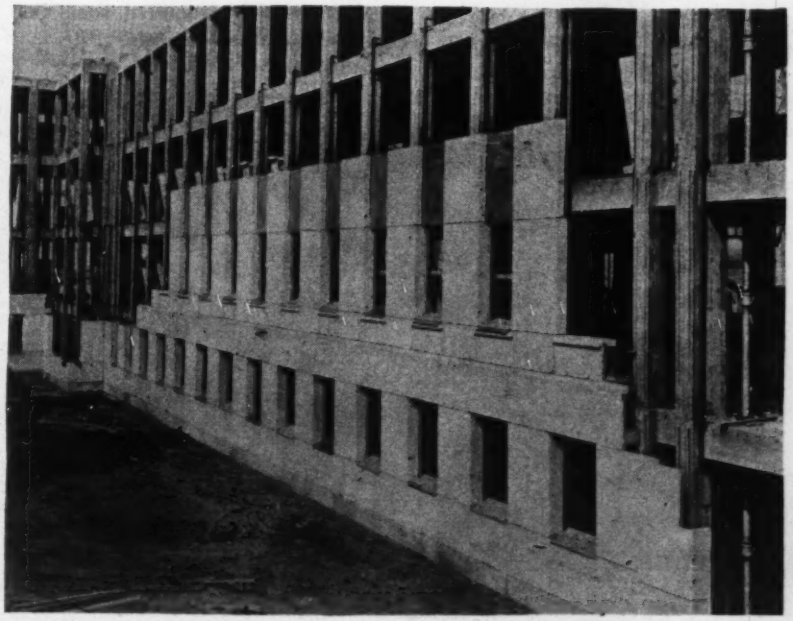
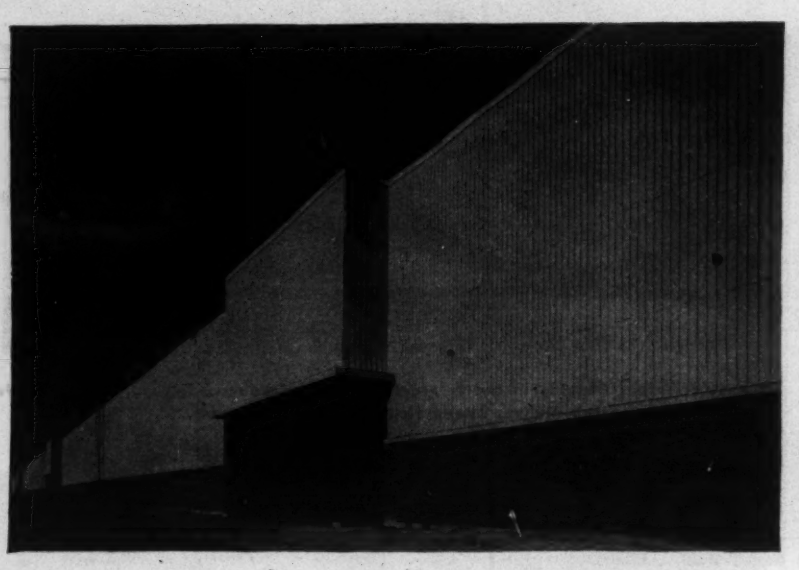


Fig. 6. Precast panels of architectural concrete backed up with brick were used for the exterior walls of Navy medical center buildings at Bethesda, Md.



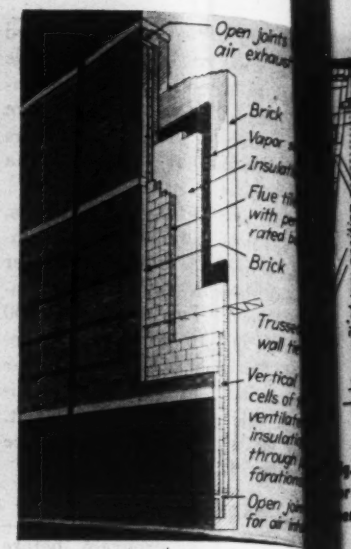


Fig. 7. Above brick base, heavily insulated, windowless exterior walls (left) of Consolidated Aircraft plant at Ft. W are faced with steel channels. Right: Brick walls of Douglas Aircraft factory at Oklahoma City are designed for ci lation of air upward within the wall to reduce tendency toward condensation.

floor level. Chord segments of the ribs are interchangeable for rapid assembly. Roof covering consists of 20-ga. steel channels laid horizontally and bolted to the upper chord of the ribs, while similar channels are employed to close the area above the end door and as sheathing for the closed end of the hangar. The door is made up of unjoined leaves that do not telescope but stack parallel in a storage tower at each side, this method requiring much less hardware than previous designs.

The buildings previously mentioned were distinguished by the layout of their floors and framing. A number of other steel-frame structures were significant because of their exterior walls. For example, the $7,500,000 naval medical center at Bethesda, Md., a large group of buildings including one of 20 stories, uses architectural precast concrete panels as the exterior facing over 8 in. of back-up brick. Not only is this the largest U. S. installation of this product to date—400,000 sq. ft. in all—but the work required some 500 different shapes of panels.

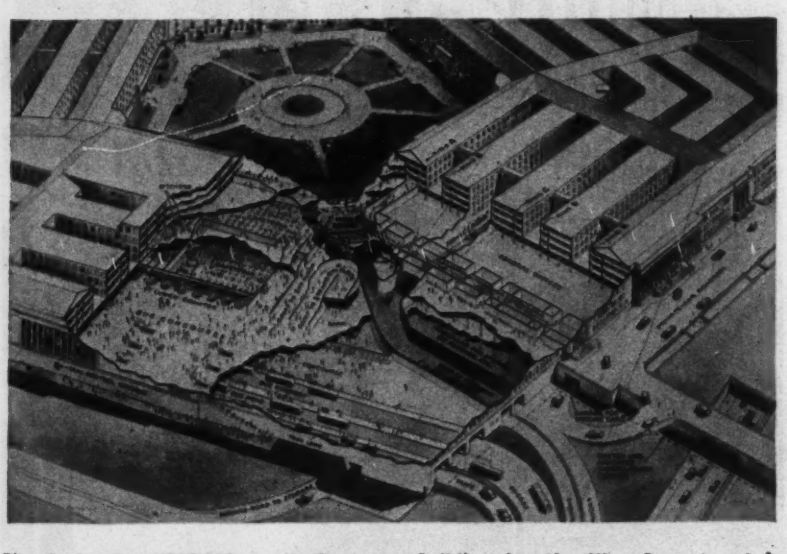


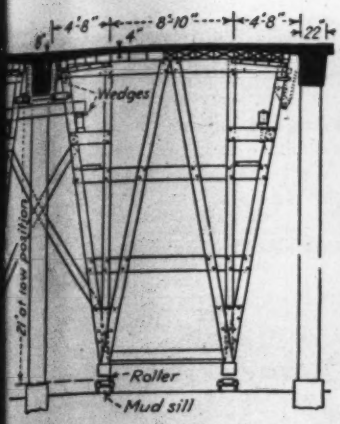
Fig. 8. In the 4,000,000-sq. ft. Pentagon Building for the War Department in Washington pedestrian travel at each level is by a system of radial corridors, while ramps are used in going from floor to floor.

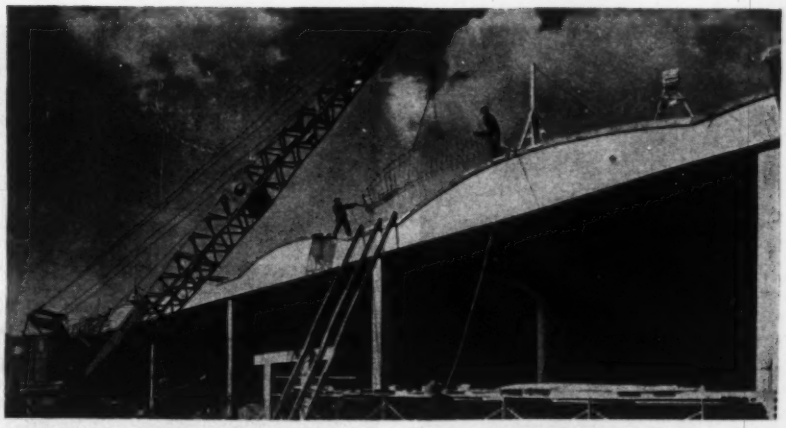
The face of the panels for abou inch deep is a mixture of transl and opaque quartz with white cem while colored aggregates were u in the spandrel panels to add var and interest in appearance. The maining thickness of the panels, a 2½ in., is of conventional concr The panels are reinforced with 4x4 galvanized wire mesh made of dia. wire.

New type steel wall panel

Another wall-and-roof design importance made its appearance the steel-frame bomber assem plants for Consolidated Aircraft Ft. Worth, Tex., and for Doug Aircraft at Tulsa, Okla., which w also notable for size—320x4,000 in plan—and for being windowl air conditioned, fluorescent light and equipped with light-reflecti white cement floors. Based on t use of insulated steel panels the closure design had as its objective shatterproof wall and roof that wou reduce heat transfer to a practic minimum, afford a high degree sound absorption and eliminate control condensation.

The structural strength of the w is provided by 22-ga. channels in. wide and 3 in. deep, extendi between structural girts attached the steel columns. The interiors the channels are filled with 4 in. glass wool, which is held in place expanded metal lath, thus serving





g. 9. A beam-and-slab roof (left), with battered beams wider than the columns to expedite shifting of forms, was used r Wright Aeronautical's one-story factory at Woodridge, N. J. Right: By use of an arched-roof design, steel requireth for the 80-acre, one-story, reinforced-concrete Dodge-Chicago plant were reduced to 2.7 lb. per sq. ft. of floor area.

sulation, sound deadening and light flection. On the outside, the 22-ga. el panels are covered with a vapor al composed of a coating of cold phalt, a vapor-proof paper and a p application of cold asphalt, fol- wed by 1-in. fiber glass insulation ard and 18-ga. ribbed facing panels, e ribbed surface providing flues en top and bottom to carry off any ndensation. Similar multi-layer nstruction was used for the roof cept that a 4-ply, tar-and-gravel ofing was substituted for the ribbed el outside panels.

Brick walls of "breathing" type

A third steel-frame building dis- guished because of sidewall con- uction is the windowless Douglas ircraft plant at Oklahoma City. milar in size and other features to bomber assembly plants, its 50- high walls, however, are of brick a special, ventilated design desig- ed the "breathing" type by the signers (Fig. 7), who developed it save the steel required in the mber assembly plant walls.

Pentagon has concentric wings

As the war progressed and struc- al steel became extremely critical, trend was away from steel-frame ildings toward reinforced-concrete uctures, and many buildings of this ss were significant. One of these s the War Department's 4,000,- 0-sq. ft. Pentagon Building, be- ved to be the largest building in world and planned to accommo- te 40,000 workers. Five stories gh, travel from floor to floor is by means of ramps instead of stairs, escalators or elevators. Another feature of the building is its layout in a series of 50-ft. wide concentric circles (or pentagonal-shaped wings) with travel lines along the radii. The concentric-ring scheme offered three advantages: First, most of the office space is sufficiently daylighted to require little artificial lighting; second, because the office space extends from one radial corridor to the next, individual offices can be varied in size and shape; and third, toilets, drinking fountains, public telephones and similar facilities are concentrated along the radial corridors.

The outer walls of the Pentagon Building are of limestone backed with brick, while other walls are of reinforced-concrete rusticated by visible form marks.

Departing from the conventional and building a large one-story factory of reinforced concrete, the Wright Aeronautical Corp. in Woodridge, N. J., utilized an unusual beam-and-slab design that studies indicated was more economical than timber trusses on concrete columns, a structural steel frame, or a reinforced concrete beam-and-girder frame. Reinforcing steel was held to a low amount, only 4.02 lb. per sq. ft. of floor area being required.

The windowless structure has a 21-ft. clearance under the beams and is laid out in 20x38-ft. bays. The beams, which are on 20-ft. centers, support a concrete slab 4 in. thick at the center, tapering to 8 in. at the beam supports. The columns are 18 in. square. The beams are somewhat unusual in shape being wider than the supporting columns so as to facilitate moving the forms. For the same reason the beam sides are battered 1 in. in the 28-in. depth below the haunch, to provide "draw" for easy stripping of the forms. The structure has no projections below the slabs so that the form travelers were

Fig. 10. Concrete ribs of the Navy's barrel-shell, double hangar at San Diego span 294 ft. and have a rise of 81 ft.

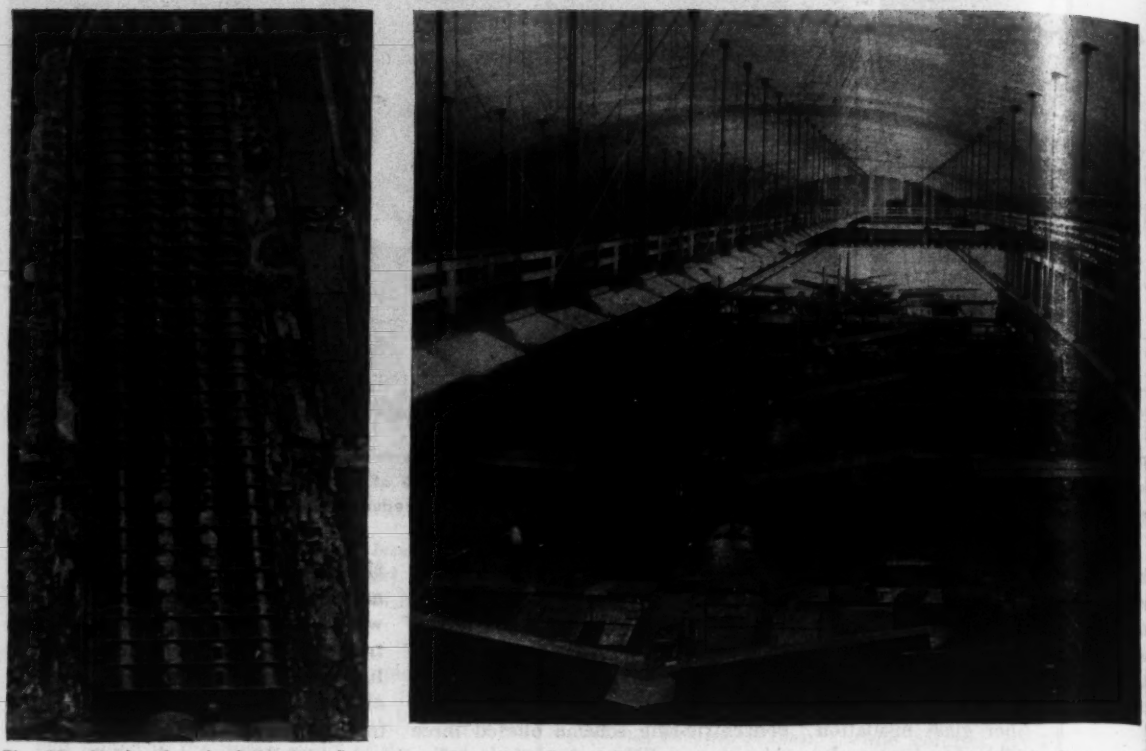


Fig. 11. At the Army's Columbus depot, a series of 45-ft. reinforced-concrete barrel arches cover a warehouse 182 x 1,562 ft. in plan, which was constructed in 36 calender days. Right: In Budd's new Philadelphia plant mercury-vapor and incandescent light fixtures are directed upward and supported along a catwalk suspended from the reinforced-concrete roof shells, which also support monorails, tracks for overhead cranes, and piping.

easily moved ahead after being dropped only two or three inches. An innovation was that column as well as the beam-and-slab forms were a part of the traveler.

Even more significant, from a steel saving standpoint at least, was the one-story, reinforced-concrete Dodge-Chicago plant of the Chrysler Corp. covering 80 acres and believed to be the largest industrial building in the country. It required only 2.7 lb. of steel per sq. ft. of floor area, a result made possible by uncommon framing consisting of multiple, thin-section, arch slabs spanning 38 ft. between concrete girders, in turn supported by concrete columns every 30 ft. Uniformly 3 in. thick, except at the edges where they meet the girders, the arch slabs are of uniform radius, 4-ft. rise and reinforced with a single layer of 4x4-in. No. 6 woven wire mesh.

Each 30-ft. length of the arch roof, which is designed to carry two 500-lb. trolleys per bay, is stiffened by a concrete diaphragm 5¾ in. wide located on the column line and at the center of the bay. The slabs and

Fig. 12. Reinforced-concrete rigid frames of 100-ft. span (left) provide principal framing for a windowless magnesium-alloying plant. Right: Framing of National Guard hangar at Des Moines, Ia., consists of reinforced hollow box-section rigid frames of 140-ft. span.

iaphragms frame into the girders, hich are 18 in. wide and 27 in. ep. Columns supporting the gird- s are 18 in. square and are unched for 5 ft. on the two sides neath the girders. This particular sign was also economical of con- ete, requiring only 6.03 in. per sq. of floor area.

Largest concrete hangar

Although structures with thin rein- rced, barrel-shell roofs had been ilt previously, at least three build- gs of the patented "Z-D" design and nstructed as part of the war pro- am were significant in one way or nother—a double, reinforced-con- ete Navy hangar at San Diego, a arehouse at the Army's Columbus, hio, general depot, and a factory for e Budd Manufacturing Co. at Phila- lphia.

The ribs of the San Diego hangar ve a span of 294 ft. and an 81-ft. se, carrying the shell at the in- ados, with the result that the un- rside of the roof presents a smooth, nobstructed surface. Such a design rmitted the use of simple, mov- le form scaffolding. Each hangar composed of four independent roof nits, each unit consisting of two arch bs supporting a thin concrete shell, hich cantilevers beyond the ribs to e expansion joints where the shell thickened slightly and stiffened by xiliary ribs.

The hinges at the ends of the arches e of the Mesnager type, and serve center the arch thrust in a pre- termined position over the footing. ch hinge is made up of thirty-two -in. vertical bars to take the verti- l reaction and twenty 1-in. bars ar- nged in a fan-like pattern to take e horizontal reaction. An innova- n in the design was the use of gh-yield-strength bars at the outside each hinge as protection against erturning moments that might be used by earthquakes; a seismic load 0.1 g. was included among the her loads for which the hangars ere designed.

The warehouses at the Columbus pot were 182 ft. wide by 1,562 ft. ng, made up of four intersecting rrel arches 45 ft. wide, supported at -ft. intervals by deep reinforced- ncrete ribs located above the roof. xpansion joints across the structure the center of alternate panels vide the roof into monoliths 80 ft. long. Thickness of the roof slab of the warehouses varies from 4½ in. at the springline to 3½ in. near the crown. By using high-early-strength concrete, the contractor completed the first warehouse in 36 calendar days, although working only five days a week and several rainy days delay.

Budd plant has indirect lighting

A minimum of obstructions at floor level, easy maintenance, efficient lighting and ready availability of the electrical and mechanical services essential to aircraft production were major objectives in the design of the Budd plant, which is 1,800 ft. long and made up of 8 barrel-arch bays. Two bays are 122 ft. wide with a maximum height of 58 ft. at the center and 28 ft. at the springline, while six are lower and only 50 ft. wide. The heavily reinforced shells of the wide span vary in thickness from 6½ in. at the springline to 4 in. at the crown. Supporting columns are on 40-ft. centers longitudinally.

Artificial lighting of the plant is unusual in that it is composed of 2,200 inverted, high-voltage fixtures

Fig. 13. Final assembly area of Douglas Aircraft plant at Chicago is spanned by 150-ft. parallel-chord timber trusses, believed to be the longest of their type in the country.

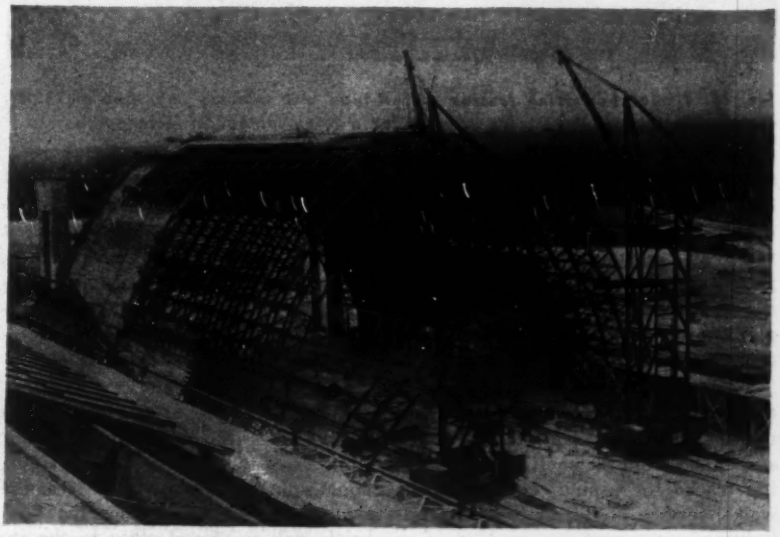


Fig. 14. When steel became critical, giant hangars for housing Navy patrol blimps were built of timber, arch trusses of 246-ft. span and 140-ft. rise being required.

Fig. 15. First plywood girders used for industrial building construction in the U. S. were double-web roof members of RCA Mfg. Co. warehouse at Camden, N. J.

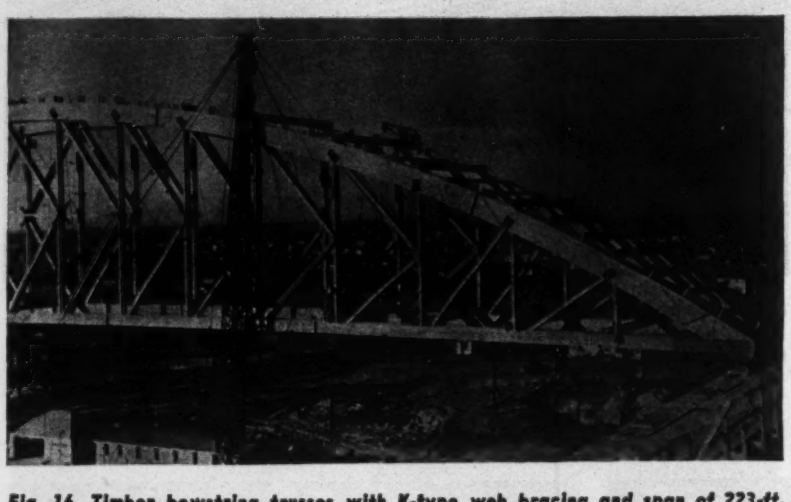


Fig. 16. Timber bowstring trusses with K-type web bracing and span of 223-ft. (longest in the country) were erected for a Navy hangar in Minneapolis.

suspended from catwalks extending the entire length of each bay. These fixtures, which include both mercury-vapor and incandescent units, are directed upward, the white ceiling serving as a reflector to provide, without glare or shadows, a uniform intensity of 55 ft.-candles at working level.

In addition to its size and lighting the Budd building is notable for the unusual amount of equipment that is suspended from the shell roof, including tracks for piping, conduits, catwalks, service platforms, heaters and lighting equipment.

Concrete rigid frames of 100-ft. span covered with precast concrete roof slabs were specified as part of the design to make absolutely fireproof a magnesium-alloying plant built for the Defense Plant Corp. Fireproofing of the 360-ft. long structure was further secured by eliminating all windows, and by the installation of an elaborate ventilation system.

Spaced on 20-ft. centers, the frames have a rise of over 40 ft. and vary from 2x3½ ft. in cross section at the floor line to 2 ft. by 4 ft. 6 in. at the center of the span. Since the 8-in. brick wall is placed close to the inside of the frame legs, the frames form pilasters on the outside of the building, enhancing the appearance of the structure by breaking up the long expanse of windowless walls.

Use of precast roof slabs permitted rapid construction, eliminated the need for purlins or beams, and resulted in an appreciable dead load reduction over cast-in-place construction, since the 6-in. thick slabs weigh only 38 lb. per sq. ft.

Precast concrete arch ribs

Although concrete was often used in lieu of structural steel, it was also utilized to save timber later in the war program. For example, when timber arch fabricators could not guarantee early delivery of glued laminated wood ribs, three-hinged, precast arches of 9½x19-in. cross sections were used for a naval auditorium-gymnasium in the Southwest.

Of 90-ft. span and 25-ft. rise, the parabolic-shaped arches were cast in two sections. The lower ends were rounded to fit circular bearings in precast seat blocks, while a short piece of 10-in. dia. pipe welded to the reinforcing in one of the half ribs was used as a crown hinge. In the erected position a pair of ¾-in. steel plates bolted to one of the half ribs engages the ends of the 10-in. pipe in a loose fit.

Box-section frame of 140-ft. span

A National Guard hangar completed early in the war program at Des Moines, Ia., rates mention because of the use of reinforced-concrete, hollow-box-section rigid frames providing a clear span of 140 ft. The design permitted a relatively flat and shallow roof, a nearly horizontal soffit at the main door and a relatively wide spacing between supporting frames. Girder and leg width is constant at 7 ft. At mid-span the girders have 7-in. thick side walls, an equally thick top, and an 8-in. thick bottom slab. At the corners the hollow leg is 7 ft. 4 in. across with 10-in. walls and middle web, and at the floor level the legs are 4 ft. 6 in. across, with the same 10-in. wall and web width.

Spanning between the girders, are 7½x12-in. beams supporting a 3-in. roof slab, making the total roof depth 6 ft. 8 in. Clear height from floor to roof is 37 ft.

If the war can be credited with providing opportunity and incentive for significant developments in steel and concrete buildings, it must also be

recognized as the cause of a completely new concept of timber construction in which timber is recognized as suitable for virtually any type of service. One of the best demonstrations of the practicability of heavy timber construction for large industrial buildings is afforded by the Chicago assembly plant built for Douglas Aircraft to produce transport planes. Here the final assembly area is spanned by 150-ft. parallel-chord Pratt timber trusses (longest of their type in the U. S. and each weighing 12 tons) supported on laminated timber columns 54 ft. high. The trusses are 18 ft. deep c. to c. of chords, the bottom chord consisting of one 8x18-in. and two 6x18-in. timbers, while the top chord is made up of one 8x20-in. and two 6x20-in. members. The end diagonals contain eight 3x12-in. pieces, and the larger vertical members utilize four 6x12's. Metal shear connectors are used to make the joints.

The glued-laminated columns were built up of 1-in. boards of varying lengths, so that no long timbers were required. The largest columns include two built-up posts, each measuring 17½ in. by 34⅜ in., separated by timber blocks but bolted together to act as a unit for supporting the trusses.

Blimp hangars of timber

Forced to make the large hangars for the Navy's patrol blimps of timber when steel became critical, the Bureau of Yards and Docks developed a timber, spandrel-braced arch with a span of 246-ft. (235 ft. in the clear), a new U. S. record, since the longest previous timber arches were those of 150-ft. span employed in the 1939 San Francisco exposition buildings. Moreover, since the hangars rise 171 ft. above the floor and are 1,058 ft. long, they are tremendous structures, each containing 3,000,000 b.f. of timber, some 750,000 of which is in the arches. The actual "rise" of the arches is 140 ft., the additional height being attained by resting them on reinforced-concrete bents. Chords and main diagonals are two-piece sections, varying in thickness from 2 to 4 in. and in depth from 8 to 14 in. The web members are single pieces, varying in size from 4x8-in. timbers in the upper portion of the arch to a maximum of 4 in. at the bottom.

The doors used to close the 120x220-ft. opening at each end of the timber hangars are of two types. The type most commonly used consists of 37-ft. wide vertical timber leaves supported at the top by a deep box girder carried on two high columns or pylons that provide "pockets" for the leaves when the door is opened. The second type consists of timber frame semi-domes mounted on trucks to permit them to roll clear of the opening to anchor points at each side of the hangar.

Fig. 17. Longest timber bowstrings with a Warren web system were those of 201-ft. 6-in. span used in a double-hanger for Fisher Cleveland Aircraft Division.

Plywood girders introduced

Although large numbers of plywood plate girders of several types were used later, a warehouse constructed for the RCA Manufacturing Co. at Camden, N. J., is considered the first U. S. building to utilize this type of member, a total of 198 girders fabricated on the site being erected as part of the roof framing. The typical girder spans 36 ft. and has double ⅝-in. thick plywood webs, which inclose laminated chords or "flanges" of 2x6-in. planks and vertical stiffeners varying in size from 6x10's to 2x6's. The girder flanges, which increase in section from the ends toward the center, are assembled with ⅝-in. bolts and tooth-ring connectors. The webs are fastened to the flanges and stiffeners with cement-coated nails driven in a pattern similar to rivets in steel plate girders.

Plywood girders used later included some 60 ft. long and 5 ft. deep designed for a live load of 1,200 lb. per lin. ft. These long members have single 1½-in. plywood webs, and each flange is made up of eight 2x8-in. fir timbers. Technique in manufacturing plywood girders advanced to the point where the members could be fabricated for satisfactory outdoor use in severe climates.

Fig. 18. Timber bowstrings of 200-ft. span with X-braced web system were employed in the Ryan Aeronautical Co.'s San Diego plant.

Bowstrings of 223-ft. span

Timber bowstring trusses of record size made their appearance, those with a span of 223 ft. for a naval hangar at Minneapolis establishing a new U. S., and perhaps a world record. Both chords are of laminated construction, the top being made of three leaves each consisting of twenty 1½x5½-in. timbers and one 1x5½-in. piece, while each of the three leaves of the bottom chord consists of twelve 1½x5½-in. pieces. The web bracing, of the K type, is made of solid timbers —two 4x6's or two 4x8's.

Bowstrings of 201-ft. 6-in. span in

Fig. 19. Because of added clearance provided at center of structure, crescent-type timber trusses were specified for several hangars. These trusses, which have laminated chords, are of 162-ft. span.

a hangar at the plant of the Fisher Cleveland Aircraft Division have a Warren web system and are believed to be the longest of this particular type.

Still a third record, that for timber bowstrings with an X-braced web lay-out, was established by the 200-ft. span trusses used in the Ryan Aeronautical Co. plant at San Diego. Although these trusses have laminated upper chords the lower chords are solid 12x14-in. timbers joined with steel splice plates. Vertical members, being in tension, are 1⅛-in. dia. steel rods, while the diagonals are 8x12-in. timbers.

Crescent-shaped trusses

In addition to bowstring and Pratt trusses, a number of hangars were also constructed with crescent-type roof trusses featuring glued laminated chords. Some with spans of 162 ft. are believed to be a record for this type of timber truss. The upper chords of these trusses contain three laminations of 2x10's and eleven laminations of 2x6's, thus providing a 4-in. ledge on which the rafters could be supported. Use of the crescent design, in place of trusses with a horizontal bottom chord, permitted the height of the hangar sidewalls to be reduced as much as 12 ft. in some cases.

Laminated arches of 177-ft. span

Another significant development in timber building construction was the extensive use, due to a shortage of both steel and structural timber, of long-span, glued, laminated members, including both curved ribs and beams.

What are believed to be the longe laminated timber arch ribs erected this country were employed in bui ing hangars at the Army's Vandal Ohio, modification center. Of 17 span and 57-ft. rise, the ellipti shaped ribs were built up of 1x8- structural fir lumber into a 7½x39¾- section. The thrust of the ribs, inste of being resisted by the usual tier at floor level, is taken by footin whose bearing area on the underly soil is perpendicular to the direct of the load.

The Vandalia arches were of u form cross section, but numero buildings were constructed with la inated arches of varying cross secti an accompanying photograph ill trating an attractive cafeteria w this type of framing. The three-hing ribs of this structure span 90-ft. a provide a 28-ft. maximum clear hei above floor level. The ribs are of in. uniform width, but vary in de from 14 in. at the crown to 42 in. the haunches. Spaced on 20-ft. c ters, these arches required tierods tween opposite footings.

Among the largest glued laminat timber beams are some of 67-ft. sp employed in a Seattle gynmasiu Each beam is 14-in. wide by 40- deep, and built up of 3,900 ft. b. m. 2x4-in. and 2x10-in. seasoned wood two species, Douglas fir being u for the outer edges of the beam, wh the stresses are higher, and Si spruce for the inner portion of member.

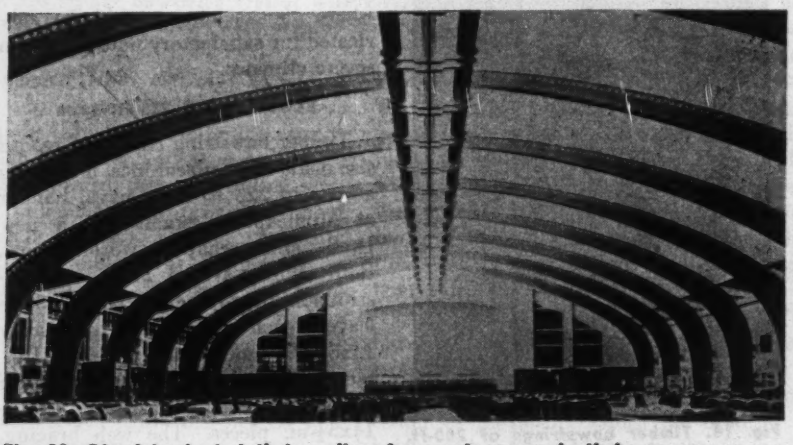


Fig. 20. Glued laminated timber ribs of many types made their appearance on war projects, including those of varying cross section and 90-ft. span used for the Boeing cafeteria shown above.

Fig. 21. Manufacturing building at Island, Ill., arsenal has concrete col and laminated timber beams.

Postwar Effect of Emergency Building Specifications

C. A. Willson
Building Materials Division, War Production Board

***Contents in Brief**—The question of the postwar effect of the emergency specifications, which were adopted to save steel, to use more concrete and to save on timber, is largely one of unit stresses. Steel and concrete stresses have both increased since the last war and the emergency specifications piled on new increases. The result may be too high for peacetime use. Timber stresses, on the other hand, had not changed much in the past 20 years, so that the increased "emergency" values are not unduly inflated.*

EARLY IN 1942, as the wartime emergency building construction program got well under way, important shortages in the supply of structural steel and reinforcing steel developed, followed about a year later by similar shortages of structural lumber. In order to save these three critical materials technical committees working under the direction of the War Production Board prepared structural engineering design manuals which could be used to obtain the most efficient use of these basic construction items.

Known as National Emergency Specifications, these design manuals (*ENR* Sept. 17, 1942, vol. p. ; Oct. 8, 19442, vol. p. 463 ; Aug. 19, 1943, vol. p. 295) related to (1) the Design, Fabrication and Erection of Structural Steel for Buildings (Directive No. 8); (2) the Design of Reinforced Concrete Buildings (Directive No. 9); and (3) the Design, Fabrication and Erection of Stress Grade Lumber and Mechanical Fastenings for Buildings (Directive No. 29). WPB revoked Directives 8 and 9 on Oct. 4, 1944.

Now that the emergency specifications have largely served their purpose, there is natural speculation and discussion of their possible effect on peacetime codes and design practices. Should the liberality of the emergency specifications relative to such things as corrosion, yield strength variations, and factors of safety be perpetuated? Should the emergency code provisions not take advantage of improvements in design procedures and construction methods be retained? Most important, perhaps, should the higher unit stresses permitted by the emergency specifications be incorporated in peacetime codes?

Some engineers favor a careful detailed survey or investigation of structures erected during the war period before drawing conclusions. Others want to see what develops as a result of research studies now under way. Whatever the point of view, it may be useful to consider what background information is presently available on the subject.

A great deal depends, of course, on the manner in which specifications and working stresses are applied. Unsatisfactory results will be obtained if engineers misinterpret the spirit and intent of a design specification for any material, either peacetime or emergency in character. One design office, for example, was found to be saving lumber by specifying material rated at 1,200 psi., accepting material on the job which was good for only 900 to 1,000 psi., and then designing the structure with a working stress of 1,800 psi. and an assumed roof live load of 15 lb. per sq. ft. in a climate normally rating 30 lb. No specifications, either prewar, emergency, or postwar, can successfully withstand such mistreatment.

With respect to the emergency specifications the War Production Board has neither the power nor the desire to dictate to others regarding, say, the working stresses to be used in the three materials concerned after the war is over. Meantime, however, it will be interesting to compare their provisions with those which came before.

Steel stress probably too liberal

At the close of the last World War the maximum flexural stress permitted in structural steel was 16,000 psi. This value was boosted to 18,000 psi. in 1923. In 1936 this working stress was increased to 20,000 psi. because the yield point of the structural steel being used had been increased from 30,000 to 33,000 psi. at the same time that the tensile strength had been increased from 52,000-62,000 psi. to 60,000-72,000 psi. The working stress of 20,000 psi. was reaffirmed by the American Standards Association Committee A-57 on Building Code Requirements for Iron and Steel in a tentative draft form just as the War Production Board started work on this subject. Working stresses listed in this draft were formally approved, adopted and became an ASA standard in 1943.

Using, then, the building code requirements of ASA Committee A-57 as standards with which to compare the working stresses contained in the emergency specifications, it is to be noted that the stress in tension was increased from 20,000 to 24,000 psi. Tension in rivets remained at 15,000 psi., but tension on bolts was increased from 12,000 to 13,000 psi. Tension on the throat section of butt welds was increased from 16,000 to 20,000 psi.

The basic column formula, the compressive stress in plate girder stiffeners and the compressive stress in the webs of rolled sections at toe of fillet were kept the same in the emergency specification as the ASA

requirements. Compression on the throat section of butt welds was increased from 20,000 to 24,000 psi. The formula for the compressive fiber stress in bending was liberalized, with an increase in the upset maximum from 20,000 to 24,000 psi. The flexural stress on the extreme fibers of pins remained at 30,000 psi.

The shearing stress in rivets, pins, and turned bolts was increased from 15,000 to 17,000 psi., while on unfinished bolts it was increased from 10,000 to 12,000 psi. On webs of beams and plate girders the shearing stress was increased from 13,000 to 14,000 psi. The shearing stress in weld metal on the throat section of fillet welds or on faying surface area of filled plug or slot welds was increased from 13,600 to 15,000 psi., while on the shearing stress on the throat section of butt weld it was increased from 13,000 to 14,000 psi. The bearing stresses on rivets, turned bolts, unfinished bolts, pins, etc. remained the same as in the ASA building code requirements.

It will be seen from the above that several factors were increased about 20 percent, whereas, other factors were left unchanged. A prominent engineer who has had a wealth of experience in design and construction in structural steel has pointed out that the factor of safety based on the ratio of yield point to working stress in flexure or tension has decreased from a value of 1.72 which was in vogue during the last war, to a value of 1.375 for designs made according to the emergency specifications. A good many engineers believe with him that this value is too low and, therefore, it seems very unlikely that the provisions of the specifications covered by Directive No. 8 will be incorporated in postwar building codes.

Changes in concrete stresses uncertain

The history of the changes in working stresses in reinforced concrete since World War I also reveals progressive increases. The compression in the extreme fiber of the concrete at mid-span of a beam was gradually increased in various Joint Committee Reports and ACI Building Codes from a value of 0.325f.′ in 1916 to a value of 0.45f.′ in 1940 and 1941. The value of the compression in the extreme fiber in the concrete in a beam at the support was gradually boosted from 0.375f.′ to 0.45f.′. During the same period of time the tensile stress in reinforcement of intermediate or hard grade new billet steel or rail steel reinforcement was increased from 16,000 psi. to 20,000 psi.

Deeper beams are necessary

With the adoption of the emergency specifications the permitted compressive stress in concrete was reduced from 0.45f.′ to 0.35f.′. This forced the use of deeper beams with a consequent saving in reinforcement. These specifications also forced the use of tied columns with small percentages of vertical steel instead of the spiral columns, with high percentages of vertical steel, which were used formerly. Also the allowable working stresses in bond in the emergency specifications were increased about 10 percent, and there were a few changes of lesser consequence.

In March of this year some of the more drastic restrictions in the original version of these specifications were eliminated (*ENR* April 6, 1944 p. 451) so that the issue now in effect resembles the ACI Building Code except for the increased working stresses in reinforcing steel. Some favor the retention of the provisions of Directive No. 9 because of the competitive advantage that reinforced concrete construction might gain when compared with other forms of construction. Others favor a return to the use of the 1940 Joint Committee Report or the 1941 ACI Code until such time as certain research projects now under way can be completed and their results evaluated. Reinforcing steel, both new billet and rail steel, has been generally available for a number of months and, therefore, it seems unlikely that serious efforts will be made to gain an immediate voluntary acceptance of the higher steel stresses after the war is over.

Timber stresses may be acceptable

In the tracing the history of the working stresses in structural lumber from World War I down to the present time, it will probably be sufficient to note the changes that have occurred for the two species that are most extensively used, namely, Douglas fir, dense, and Southern yellow pine, dense. At the close of that war, engineers specializing in building with structural lumber were using working stresses later shown in the U. S. Department of Agriculture Circular No. 295 published in 1923. After multiplying the values given in Table I of this circular by 7/6 for a dense grade we find the following values for fiber stress in bending, compression perpendicular to grain, and compression parallel to grain for both Douglas fir, dense, and Southern yellow pine, dense:—1,750, 379 and 1,283 psi. The horizontal shear for dense Douglas fir thus determined was 105 psi. and for Southern pine 128 psi.

Values identical with these were reaffirmed in the tables of working stresses given in U. S. Department of Agriculture Technical Bulletin No. 158 published in 1930. In 1934 there was published a table of basic stresses not working stresses, in U. S. Department of Agriculture Miscellaneous Publication No. 185. If these basic stresses are multiplied by 0.75 to transform them to allowable working stresses we find the same values as given in the two other bulletins. No further changes in working stresses were made until the issuance of the emergency specifications known as Directive No. 29. Therefore, it would appear that for 20 years working stresses in lumber remained constant.

A comparison of the working stresses shown for these species and grades in the emergency specifications with the values indicated above will reveal that a 20 percent increase has been made in all characteristics—fiber stress in bending, compression perpendicular to the grain, compression parallel to the grain and horizontal shear. Many believe that we would be justified in adopting the working stresses given in Directive No. 29 for permanent use after the war.

In the final analysis, of course, postwar code changes will occur in the same manner as they did in former peacetime years—through discussion, research, technical committee studies and the voting of members of code-making bodies such as the American Society for Testing Materials, American Society of Civil Engineers, American Concrete Institute, American Institute of Steel Construction and the like. The emergency specifications will have no force at the end of the war, and it is therefore, only through the above machinery that any of the provisions can emerge as sections of our permanent codes.

. 1. Copacabana beach lined with new apartments typifies the results of current building activity in Rio de Janeiro.

South American Building is Challenging

Arthur J. Boase

Manager, Structural Bureau, Portland Cement Association, on leave as Special Editorial Representative, Engineering News-Record

itor's Note—Chosen, because of his thorough knowledge of reinforced ncrete design and building code practices in this country and Europe, to port on these matters as they exist in South America for the readers of gineering News-Record, Mr. Boase spent the past summer in Brazil, Argen- a and Uruguay. His articles are planned to make available, for the first e in the United States, the detailed methods of design and the code ovisions that permit South American engineers to use concrete more idly than we do. In this opening article of the series he presents the gen- l picture of South American building as background for the more detailed icles to follow, noting among other things, that codes are favorable to ncrete, that material costs are high and labor efficiency low, that South erican engineers are constant students of mathematics and that indeter- ate design methods are universally used.

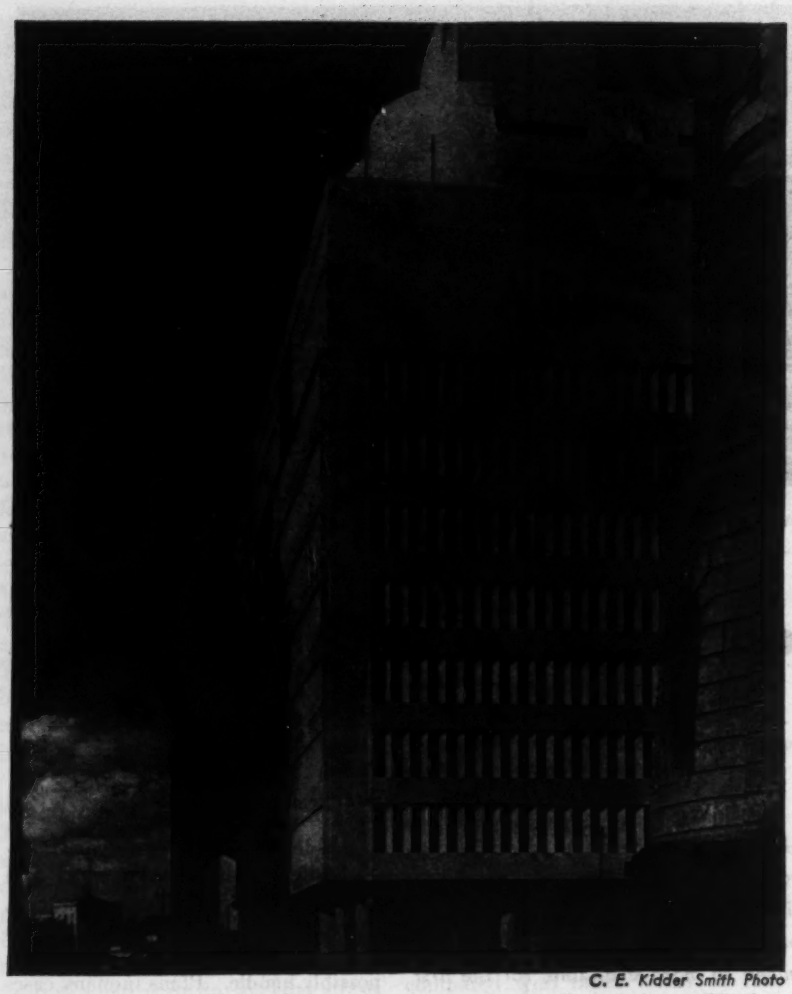
CH HAS BEEN WRITTEN and much been said lately regarding build- in South American countries. ne travelers returning from there ak of the building "boom". Others ist that no "boom" exists, but that large activity in this field is a ural growth and that it will con- ue indefinitely. Even laymen ak of the "cement" buildings under struction, and call attention to the in members". Construction photo- phs have been published that baffle gineers familiar with such things. ere is much talk about the cost materials, and especially labor. Some even speak of unsoundness of construction.

What are the facts? What types of buildings are being erected? If concrete is so greatly used, why? What are their methods of design? How do these buildings perform over the years? Knowing that questions such as these are in the minds of engineers in the United States, the writer made the determination of as complete answers as possible the objective of a three-month visit to South America this past summer. This article is the first of several reporting upon the findings of this trip.

Building activity is great in all cities visited in Brazil, Argentina and Uruguay. Everywhere the architects, designing engineers and contractors seem to have all the work they can possibly handle. Plans in many cases are only a few days ahead of the construction.

Activity of boom proportions

Certainly Rio de Janeiro, a city of about 2,000,000 people, is experiencing a real boom. From one street intersection in the business section it is possible to count 11 buildings under construction within a radius of two blocks, buildings ranging from 12 to 24 stories in height. Everywhere one goes older buildings are being razed to make room for bigger and taller structures. And squarely in the center of the city, on a strip about 260 ft. wide and 1.8 miles long, which was recently cleared, is being built the Avenida Presidenté Vargas, said to be the widest boulevard in the world. The right-of-way for this highway was condemned by the government, and at the same time a strip on either side was acquired through condemnation for the erection of apartment houses, plans for which are actively going ahead.



C. E. Kidder Smith Photo

Fig. 2. Quebra sol or sun baffles provide shaded offices in lieu of air conditioning. In this new home of the Brazilian Press Association 2¼-in. concrete panels 32 in. wide, which constitute the baffles, are set vertically and fixed. In some other buildings they are horizontal and hinged.

At Sao Paulo, Brazil's second largest city and first industrial center, with a population of about 1,300,000, building is no less active. At present there are four buildings under construction here of 30 or more stories, and one of these, the building of the police department, will rise to the unprecedented height of 165 meters (about 540 ft.) above the street level. It will have 40 stories and three basements and will supercede the Kavanagh Building of Buenos Aires (Fig. 5), rising 102 m. above the ground and having 28 stories, as the world's tallest all reinforced concrete building.

In this area factories are springing up in all directions. There are under construction at the present time mills, apartment houses, residences, theaters, and most all other types of buildings for civilian occupancy. In addition, much military building is now under way. At Volta Redonda a new city is being erected around a modern steel mill now under construction. All facilities, in the form of residences, hospitals, clubs, hotels and other types of structures needed for a modern city, are involved.

Military construction in Argentine

In Buenos Aires in the Argentine, building rivals that in Brazil, while in Montevideo, Uruguay, it is active but not on as large a scale as elsewhere. At present the Argentine is engaged in a vast military expansion program, barracks, airplane factories, munitions plants and the like being of first importance. Estimates vary, but from a number of sources figures indicate that from 500,000,000 to 1,100,000,000 pesos ($125,000,000 to $275,000,000) will be spent on this work between now and the first of 1945. Some idea of the size of these projects is conveyed by the fact that one airplane assembly plant now under construction with the shell type of roof required $75,000 for the design calculations alone.

Concrete frames predominate

If Brazil, Argentina and Uruguay are typical of all South American countries, and inquiries made indicate that in general they are, then the questions given above can be answered with a reasonable degree of accuracy. In all of the cities of these three countries visited, reinforced concrete was the only material being used on the projects seen under construction. Careful inquiry indicates that this has been true for many years. Some of the older buildings do have structural steel frames, most of the steel having been imported from Europe. An attempt was made to determine the approximate cost of a ton of structural steel erected in a building or what it had cost when it was being used, but apparently those queried had had no experience since none would hazard a guess.

There is a scarcity of all materials needed in the building field, and in addition there is a shortage of labor and of designing engineers. With respect to the latter, however, one feature should be considered by U. S. engineers who would rush into South America. Most countries there have license laws, and unless one is a graduate of a local school this much needed license is very elusive.

Transportation is the bottleneck. Shipping is entirely inadequate and fuel is very scarce. In places, obtaining fuel is so difficult that cement mills are experimenting with blowers which will handle coffee for burning the clinker. In one location at least (Argentina), cement is being manufactured by the use of bran as fuel.

The general type of construction in these three countries is the same. It consists of reinforced concrete frame and floors, with walls of hollow tile, brick or concrete block, these in turn being coated with stucco. Fully 90 per cent of all buildings are so built. There are some with stone facings, some of exposed brick, some of architectural concrete, but their number is very limited.

Why is reinforced concrete being
d? The first and most obvious
son is the scarcity and high price
tructural steel. This commodity is
manufactured to any extent in
th America, and importing is an
ensive process even when ships are
ilable. In Brazil there are high
es that this situation will be cor-
ted on completion of the new steel
nt at Volta Redonda, some two or
ee years hence. This plant will
e a capacity of 1,000 tons per day,
be equipped with a modern roll-
mill and all other facilities for the
duction of shapes. However, com-
ent men who have studied the steel
rket thoroughly are of the opinion
the needs of the railroads in
zil will require the entire output of
plant. If they are correct, rein-
ced concrete will continue to be
main structural material for build-
for a long time to come.

Design has European background

There are other reasons, not so
ious. The first firms of designers
constructors in South America
e Italian, French, and especially
rman. Coming from countries
ognized as the oldest and among
largest users of reinforced con-
te, these engineers had developed
ign theories and had applied them
ely in their own countries long be-
e the use of concrete had become
eral in the western hemisphere.
reover, when these firms came to
th America they were equipped
h to design and construct. A client desiring a building for a certain occupancy merely stated his requirements and the constructor acted as architect, designing engineer and builder. This practice obtains to a very noticeable extent in South America today. The firms doing business there now are not necessarily foreign, but the South American people who have taken over have continued this practice.

Such a set-up could and likely does produce very economical results. The people making the design are in a position to know the possibilities and limitations of their own manpower and equipment, and can take full advantage of the one and design to avoid the other. They are not at the mercy of independent designers who may decide what is "practical" and what is not without knowing who the constructor is to be or what his possibilities and limitations are. Further, the designers know that the owner will "shop" for the best price, and competition will force the utmost economy. This in turn will be brought about through the use of the best available materials under the circumstances, and by adjusting design practice so that the proper relation between cost of materials and cost of labor is obtained.

It does not follow that all work, or even the majority of it, is done under this client-contractor relationship. There are many firms of independent architects and structural engineers doing an active and large business. The fact that these integrated organizations are in the field and are active in securing commissions cannot but help stimulate thinking along lines of economy among the independent firms of designers.

Codes favorable to concrete

Reinforced concrete codes play no small part in explaining the wider use of reinforced concrete in the building field. Brazil as a nation is now operating under a national code known as "NB-1, Calculo e Execucao de Obras de Concreto Armado". Adopted in 1943, it is different in intent than, say, our American Concrete Institute Building Code in that it applies, as the title indicates, to all reinforced concrete construction and not only to buildings. It is favorable to reinforced concrete and permits many things unheard of in United States practice. On the other hand the unit stresses and specified design loads are not greatly different from those with which we are familiar in this country.

This code will be studied further in a subsequent article. It is only necessary here to point out certain unusual provisions such as the statement that buildings not subject to shock or heavy vibration may be designed with a factor of safety of 2 and a uniform stress block on the cross section of the concrete in the compressive zone of 75 per cent of the 28-day strength. A few in the United States have advocated similar regulations, notably C. S. Whitney ("Design of Reinforced Concrete Members Under Flexure or Combined Flexure and Direct Com-

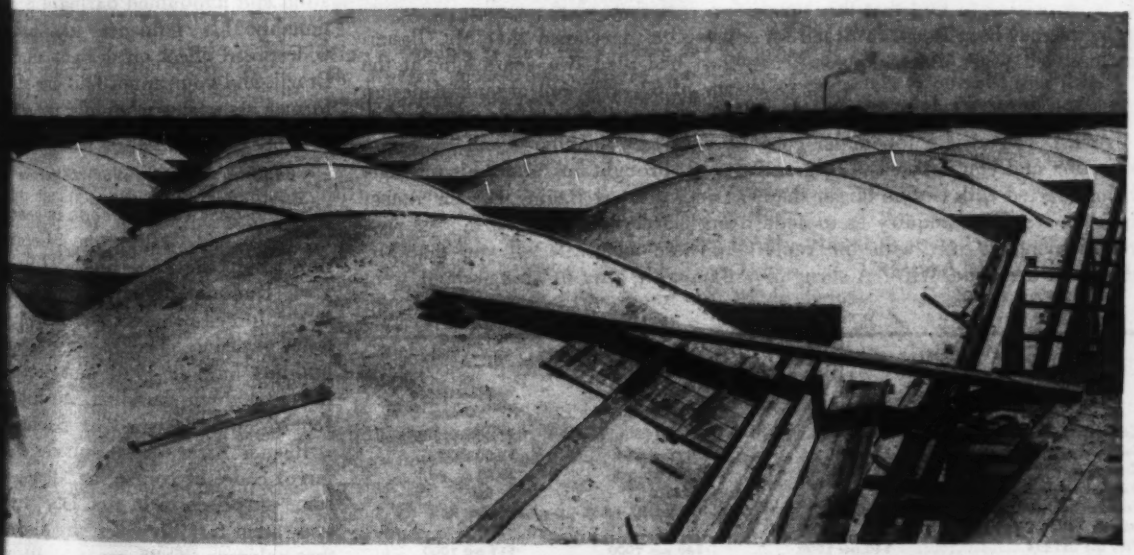


Fig. 3. Thin-shell construction, such as this "sawtooth" roof on an industrial building, is widely used in the Argentine.

Fig. 4. Exposed first-story columns, curved concrete stairways and sun baffles in front of the windows characterize the entrance to the Instituto De Desseguros Do Brazil.

pression", Proceedings of the American Concrete Institute, Vol. 33, 1937, p. 483), but they have never been given deserved serious consideration by code making groups.

Probably the only other country using a similar regulation is Russia. There, for some years prior to this world war, all government buildings were, by edict, designed under a similar specification.

The building code committee of the American Concrete Institute was much pleased, and rightly so, when it was able to incorporate a section in the 1941 code requiring flat slabs to be designed by frame analysis methods. It is surprising to find that this same principle has been in use in Brazil for at least ten years, if not longer.

Baumgart Influence

Again, you visit a job under construction and you notice tied columns being erected with ties no larger than baling wire. Your inquiry as to code requirements is met with the reply that there are none. Why? A shrug of the shoulders, the word "Baumgart", and the subject is dropped.

No one studying reinforced concrete design in Brazil can escape learning of Emilio Henrique Baumgart. In *Engineering News-Record*, Aug. 6, 1931, p. 208 appears a short description of a three-span girder bridge designed by Mr. Baumgart, the center span of which is 224 ft. This is still the longest concrete girder span in the western hemisphere and was erected by cantilevering from the shore piers to the center of this center span, and without the use of shoring. Since reading this article the hope to talk to Mr. Baumgart has ever been an ambition of the writer. Inquiry, however, developed that Mr. Baumgart had died two years ago, at the age of 53. His well organized design office is still functioning with five young men in charge, all of whom were "brought up" under his tutelage. You will meet Baumgart men almost any place you go in Brazil.

These men will tell you that Mr. Baumgart, after finishing school, went into the contracting business but that he did not have the "disposition" for that work. He fretted about the structures that he had to construct and felt that they were improperly designed. Eventually he failed in this field, and then opened up his own design office.

Reinforced concrete in Brazil at that time was new; and there are those who say that Mr. Baumgart hired experienced designing engineers from Sweden, Denmark, Germany and other places, brought them to Brazil to work in his office, that he was not too generous in the matter of pay, and that these young men only stayed long enough to learn the Portuguese language and then worked for others or opened their own offices. Others will tell you that he employed young men from the engineering school of Rio de Janeiro to work in his office after school hours, that he was a good teacher, a sound technician, and that he taught his methods to these young men, asking that they be hard workers, that they have a good foundation in mathematics and mechanics, and that above all they have vision.

It is obvious from the work that Mr. Baumgart did that his designs were always original. His former associates will tell you that he had the "feel" of reinforced concrete, and that if methods of calculation were not available he sensed the magnitude and type of stress. He himself was a good student. His office library is one of the best to be seen anywhere, and it shows signs of real use. He was a tireless worker, a man of great imagination and undoubted daring. Unquestionably his influence has had a widespread effect on designs all over Brazil, and you cannot find one of the former associates who does not speak admiringly of him.

Building codes favor concrete

While the Brazilian code in general is fashioned after the German throughout there are tinges of Baumgart. Undoubtedly he had great faith in reinforced concrete and used it on every occasion. The 22-story A Noite building built in 1928, and probably the first high building in Rio de Janeiro, was designed by Baumgart.

Buenos Aires operates under a different code, of course, and there are some surprises in it, too. One strikes you rather forcibly when you discover that columns 25x25 cm. (10x10 in.) may be designed with a permissible

TABLE 1—BUILDING MATERIALS COSTS IN SOUTH AMERICA

	Rio de Janeiro Brazil	Buenos Aires Argentina	Montevideo Uruguay
Cement	85¢—94 lb. bag	75¢—110 lb. bag	$1.00—110 lb. bag
Sand	$2.40 cu. yd.	$2.25 cu. yd.	$2.00 cu. yd.
Crushed rock	$2.40 cu. yd.	$2.80 cu. yd.	$3.80 cu. yd.
Reinforcing steel	9¢ lb.	10¢ lb.	8¢ lb.
Form lumber (mostly Yellow Pine)	10¢ bd. ft.	13¢ bd. ft.	16¢ bd. ft.
Clay tile 8x12x4	$40 per 1000	$40 per 1000	$17 per 1000
Concrete block 8x8x4	$30 per 1000	Not much used	Not much used

on the concrete of 45 kilograms
cm., and that as the size of the
n is increased this permissible
may be increased up to 80. The
is that as columns become
the concrete is more easily
and therefore better and capa-
carrying a greater unit load.
other points might be men-
about these codes, but these
taken up in a later article.
of the above reasons contribute
ial answer to why reinforced
ete is so widely used. It would
cult to evaluate them separately,
rtain it is that cost of structural
lone cannot be the whole an-
When you ask a designing engi-
what he would do if structural
ere available he states that he
first design in reinforced con-
make a redesign in steel, and
ase his choice on ultimate cost.
s almost diametrically opposite
ocedure followed by most engi-
in the United States. Most struc-
men here would first design in

Costs are not low

fact that reinforced concrete is
nomical type of construction in
American countries does not
that it is cheap. Material costs
y high, as indicated in Table 1.
gh these figures are necessarily
ximate, in general, they are as
s a designing engineer in South
a will have at his disposal since
ere obtained directly from con-
s and checked against office
of designing engineers. They
dicative.

is greatly impressed by the
of 8 to 10¢ per lb. for rein-
steel, but the full effect of this
rice is not brought home until
sits jobs under construction or
he meets with some incident
s occurred at the Instituto de
sas Technologicas de Sao
A standard Brazilian test was
run for determination of im-
bility of concrete. The appara-
sisted of a concrete box about
18 in. This was nearly filled
n oil having the viscosity of a
el oil. In this box was placed
smaller concrete box with
bout 1 in. thick made of the
te to be tested. The box under
ntained a small amount of al-
and the index of impermeabil-
the rate of contamination of

Fig. 5. Edificio "Kavanagh", Buenos Aires' skyscraper and until recently the world's tallest reinforced concrete building. Height 335 ft. above grade

Fig. 6. Building in Sao Paulo boxed in to protect pedestrians. Boxing has been partially removed, showing buff and white tile finish, the same as used on bathroom floors in the United States.

this alcohol from the seepage of oil through the concrete. When inquiry was made as to the reason for not adopting our 6-in. disk method of test the answer was that this required at least ¾-in. steel plates and that they were too expensive and too hard to obtain!

In another instance when a large military installation was under way and window casements were being precast on the job with mullions about 1½ in. by 1 in., it was noticed that the reinforcing steel being used was edge trimmings about $\frac{1}{16}$ in. thick and ¼ to ⅜ in. wide from a plate mill. In any language it was good scrap. It was as limber as twine, but the engineer had rigged up a little gadget to a small electric motor which automatically twisted the metal to make it stiff enough to place in the forms!

There is an old Portuguese proverb which states, "If one desires to go hunting and does not own a dog he must secure a cat". South American engineers know how to secure cats.

Some practices seem strange

The cost of form lumber is likewise a great surprise, and again reflects scarcity. In spite of this, contractors in Sao Paulo, because of city ordinance, are required to encase entire buildings with boards during the period of construction (Fig. 6). The first time you see one of these jobs you wonder where they are moving the building in its splendid crate. The lumber used is relatively thin, about ⅝ in., and is used over and over. Some contractors tell you they do not object since the sale of space for advertising in the way of posters about pays erection costs. On state buildings, however, advertising is prohibited. In a country that claims it is "poor", it is hard to justify such practice.

Appreciating that the question "How much does a cubic yard of concrete cost in a building frame" is in the same category as the question "How high is up", figures obtained from several contractors in Brazil check very closely at about $40 per cubic yard. Of this $40, $8 or 20 percent represents labor and $32 or 80 percent represents the cost of materials. Compare this with American costs of about $25, and a 50-50 distribution. The reason for using thin members in South America becomes apparent.

In spite of this high cost of materials, Brazil is requiring air raid shelters, to withstand the effect of 100-lb bombs, to be constructed in practically all buildings. To meet this requirement Brazilian engineers are constructing 8-in. reinforced concrete walls in certain areas of their buildings. At the above price of concrete these shelters seem to be a very great luxury, especially when one considers the size of bombs already in use in this war.

Table 2 gives figures on the cost of labor in the larger cities of the

three countries visited. These prices are necessarily approximate. For instance, the figure of 80¢ per 8-hr. day in Rio, varies considerably, and may not apply at all in other Brazilian cities. Labor cost in Belem, a fairly sizable city on the northern coast of Brazil, was checked and it was found to be 45 rather than 80 cents. Again the figure for foremen might be $50 rather than $75. Nevertheless it is believed that the table is accurate enough for estimating purposes. These costs are rising, but not so rapidly as are those of materials.

Labor efficiency low by our standards

From the cost of $8 labor for a cubic yard of concrete, and the price of common and skilled labor from Table 2, one deduces that it takes an unbelievably large number of hours to produce a yard of concrete. However, care was taken to check these figures, not only in Rio, but with contractors at Sao Paulo, and a remarkably close agreement was obtained.

No time studies were made, but you do not need them to know that construction moves slower than in the United States, and certainly more laborers are required. A very good illustration of this is afforded by a relatively common method of lifting brick from floor to floor. One man picks a single brick from the stock pile and places it on a flat wooden paddle with a long handle held by another workman. The latter then executes a motion similar to pitching hay, which throws the brick to a third laborer on the floor above. This laborer in turn gives it to a fourth laborer who places it on a stock pile. You ask if that is an economical method and are told that "men are cheap". Your respect for the hod carrier method is raised no little. It is very possible that because of the cheapness of labor carelessness creeps into its handling.

The South American engineer has

Fig. 7. Cast-in-place groined roof of a public market in Buenos Aires is symbolic of South America's freedom in the use of concrete.

one very great and noticeable advantage over his brother engineer in the United States. He is less provincial. His knowledge of foreign languages is far superior. Most of the men met could speak French and German in addition to Spanish or Portuguese as the case might be. A surprising number can speak English. It seemed that all of them can read French, German and English. A sizable percentage can read Italian, and some can speak it. A few more can read Russian, and many more are studying it.

Leading designers are young men

One of the most interesting observations of the whole trip had to do with the age of the men doing the majority of the work visited. They are very young. One office, where over 20 men are regularly employed, boasted that the combined experience of the five men in charge of the business was 60 years. The ages of these men ranged from 25 to 35 years. They have done and are doing millions of dollars worth of work. In another office a 500-ft. reinfo concrete train she was being signed, and the man in charge 25 years old. Of more than 30 signing engineers interviewed, four were over 50 years old, an these two were recent refugees f Europe.

The textbooks used in the coll for the most part are French and man. Most of the practicing e neers have libraries well stocked French and German technical b and publications. Surprisingly have the *Proceedings* of the Amer Society of Civil Engineers or *Journal* of the American Conc Institute. The *Joint Committee port* has been translated into S ish and is well known. So is American Concrete Institute *Buil Regulations for Reinforced Conc* The German 1932 code and all o German "Deutsche Normen" much in evidence and greatly co

There are those engineers who plain that American textbooks reinforced concrete are too el tary. Others state that their co too high, and feel that they are ing too much binding and fine p ing. French and German books for the most part, paper covere are the local textbooks.

Wider engineering education

Engineering colleges are relati small and few in number as pared to the United States, and S American engineers state that o the big needs is the enlargeme these institutions. At present entr examinations are apparently des to limit the number of students the school accommodations than to produce the number of neers needed to meet the require of rapidly growing countries.

Laboratory courses, if any, are limited, and drawing room wo held to a very minimum. Most work that would be done in drawing rooms of American co is considered an outside activity first thought this might seem to very great disadvantage, but some time there you discover does have some compensations i it permits more time to be devo intensive training in mathemati mechanics. All of the engineers t to were great admirers of the of Timoshenko and Westergaard cause of the mathematical natu

TABLE 2—CONSTRUCTION LABOR COSTS IN SOUTH AMERICA

	Rio de Janeiro Brazil	Buenos Aires Argentina	Montevideo Uruguay
Common Labor	80¢—8-hr. day	$1.60—8-hr. day	$1.60—8-hr. day
Carpenters	$1.45—8-hr. day	$2.50—8-hr. day	$2.00—8-hr. day
Steel Setters	$20 per ton	$2.50 per day	$2.00 per day
Foremen	Up to $75 per month	$75 per month	$2.25—8-hr. day
Finishers	$1.25—8-hr. day	$2.50—8-hr. day	$2.00—8-hr. day
Bricklayers	$1.25—8-hr. day	$2.50—8-hr. day	$2.00—8-hr. day

writings on specific problems. neral, more years are devoted ege work by the students in ountries than is thought neces- the United States. In the al schools of Brazil a period years is devoted to college in Argentina, six. The pro- l system follows somewhat the of the European schools. numbers of practicing engi- re rated as professors, and a few hours a week to actual m work. To visit with these ors was one of the great ad- s of this trip. Their enthus- r their work, their patience dents, their anxiety to give e very latest and best teach- ir feeling of pride in the ac- iments of the young engineer- duates makes one proud of the ring profession, and brought he realization that college both at home and abroad, foundation on which good en- g practice is built. Too little ion is given them in the States.

zil, all who wear a ring with apphire flanked by diamonds gnia of the engineer) may be Doctor", but a professor ranks That is good and seemingly oper. Similar honors obtain South American countries.

siga methods followed

chnical books used and the of the professors are re- the design methods in vogue ssional offices. A great fa- building design is the fixed-

C. E. Kidder Smith Photo

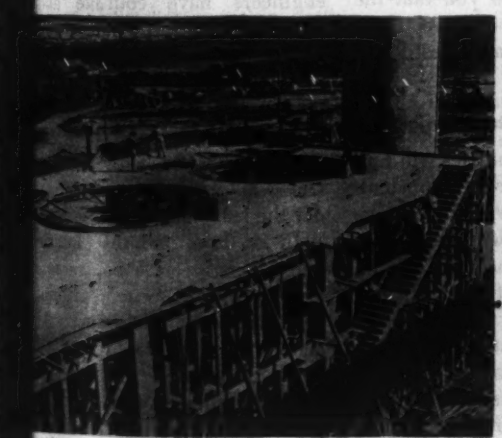
Fig. 8. Characteristic of reinforced concrete work in Brazil is this cantilevered stairway in a new apartment house in Rio de Janeiro.

point method (see "Moments in Restrained and Continuous Beams by the Method of Conjugate Points", by L. H. Nishkian and D. B. Steinman, *Trans.* A.S.C.E., No. 90, June, 1927, p. 1) so widely used in Germany. The general use of this method, however, does not mean that the classics —method of least work, virtual work, elastic weights, area moments, etc.— are not well understood and extensively applied.

Maney is a well known name among South American engineers because of his writings on slope deflections. In one office invitation was extended to go through the wind calculations for a 34-story building of three-bay width where slope deflection was the method used for determining moments in columns and girders. The wind was taken at about every fourth floor, and the intervening floors were connected to columns by sliding joints to prevent their taking moment.

The girder taking greatest wind near the bottom of the building had to be designed for a bending moment of 10,000,000 ft.lb. This girder had a width of 39 in. and a depth of 82 in. It was reinforced with thirty-two 1¼-in. round bars both top and bottom. The columns at the same elevation and in the direction of the wind were 78 in. deep. In the calculations for wind moment in this building some 37 simultaneous equations had to be solved.

Moment distribution is also just now getting a start in South America. Very recently a textbook has been printed, "O Metodo de Cross", by Candido Hollanda de Lima of the faculty of the Escola de Arquitetura de Belo Horizonte. This same professor gave a paper at a symposium on structures held in Rio de Janeiro during the past summer. He is an enthusiast on the subject, and his classes are receiving thorough drilling in the method. A number of practicing engineers interviewed are also using the method in their regular practice. Wind stresses are usually determined by approximate methods such as those advocated by Robins Fleming.



o of the most notable projects in Brazil are the Volta Redonda steel mill and the national motor factory. Four- r blast furnaces (left), which will increase Brazilian pig iron output fifty percent, contain heavy concrete fram- factory machine shop (right) is built with concrete rigid frames.

Fig. 10. Intricate and heavy concrete framing in a Brazilian theater. Ceiling slabs are purely decorative and are supported from above.

Just how rigorous the calculations are depends on the layout of the building. On ordinary jobs the "Zement Kalender" is much in evidence, and the tables of moment coefficients found therein are widely used. Likewise, in such structures, column moments are usually given little consideration. Competition, too, seems to play a major role in such matters.

Many unique floor systems are in use, and these will be discussed in a later article. One- and two-way slabs, with and without filler tile, are very popular. German regulations on two-way slabs are widely used, and Lossier's book can be found in most offices. Plastering is done directly because of the high cost of metal lath.

The fireproofing requirements are similar to those being used in Germany. For instance, 1 cm (.4 in.) is the protection required on reinforced concrete columns compared to our 2 in. Every attempt was made to locate a job where a fire had occurred to observe results, but none could be found. Oldtimers were sought who might give even secondhand information, but the hunt was without success. Americans who have lived in these countries for many years marvel at the few times they have ever seen fire fighting apparatus. Whether this is due to climate and the little provision made for heating of building is not known. However, Germany seems to get along with about the same protection.

Thin shell roof construction is no novelty in South America, especially in the Argentine, and it was a great surprise to meet so many engineers thoroughly familiar with applicable methods of calculation. The writings of Dischinger, Fensterwalder, Foppl and others have been carefully studied, and many such structures have been built by a number of engineers.

Prestressing of reinforcing steel is just starting, but many engineers there are making thorough studies of the process. Many will tell you that the future for reinforced concrete is in thin shell construction and prestressed reinforcing.

Some examples of bold design

A visitor to these countries will find the structural engineers competent. That they are students can easily be determined. They are energetic, they are enthusiastic and they are daring. Their courage can best be illustrated by a few examples.

It is common practice to design footings without a single pound of reinforcing. In one instance circular step footings were being installed to support a 24-story building. The practice is so old that South American textbooks carry methods of design.

A hotel building is now
erected, and was up to grade
viewed. The architect required
the first floor be clear of all col
for its entire width of some 8
Above this first story there ar
floors. The designing engineer pla
single span rigid frames on
17-ft. centers to support the
24 stories. Each column of these
frames will carry about 5,700,00
and will be 39 in. by 78 in. Afte
calculations for this structure
been carefully made, elaborate m
studies using deformeter gauges
used to check the calculations.

Another case in point is a 12-
building where the architect req
that no columns or beams pr
into the rooms. The engineer de
varied shaped thin columns to ac
plish this result. At the corner o
building the columns were in
shape of an angle with wings as
as 6½ ft. in each direction. At i
sections of partitions and wall
columns would be in the shape
T. Some were in the form of a
no case were these columns more
4 in. thick.

For floor construction, form
very light wood were devised w
could remain in place. Over
under this form were cast thin
with intermediate ribs as diaphra
Of course, the stairwell walls as
as the walls of the elevator shaft
utilized as columns. The spans in
eral were about 16 ft., and all
plastered direct. Observation indi
that no trouble had developed
though the building was several
old.

It is obvious that these desi
engineers have courage and
fidence. They most certainly have
in their calculations. As an aid
have codes which are flexible.
too, they have been "brought up
concrete design, and they are
oughly familiar with their su
One would expect great progres
der the leadership of these men.

In a three months' hurried
many engineers, contractors
architects were visited, without a
gle unpleasant experience. All
gentlemen one would like to
better. They were kind, patient,
erous, intelligent and thoughtf
yond description, and when you
them your one hope is that o
tunity will present itself to be
them again many times.

An Architect's View On

Effective Teamwork in Building Design

Thomas H. Creighton
Alfred Hopkins & Associates, Architects-Engineers, New York, N. Y.

***Contents in Brief**—In this article and the one that follows, an architect and an engineer make a plea for more intelligent cooperative use of their respective abilities in planning and designing buildings. They envision this partnership increased to a threesome by the addition of the contractor, with the result that we will produce real "modern" designs—efficient, sensible, economical—with or without the use of radically new materials, of which very few are presently in prospect. They use as an example a postwar design for a Nurses' Home for Bellevue Hospital in New York. Starting with the size and furniture requirements of a single room, all planning and design steps are integrated. Two of the interesting structural results are a cavity type wall and a thin flat slab that serves as floor and smooth ceiling and in addition is the heating surface by virtue of encased pipe coils.*

THE SHAPE OF OUR BUILDINGS in the postwar period is a matter of interest to all engineers, architects, and builders. Some confusion exists at the present time, for one reason because of an incomplete understanding of "modern" architecture—which seems to be something that we all desire in theory, but from which we shy when we put pencil to paper—and for another reason because of an uncertain expectation of new materials. While half of the architects and engineers are thinking and talking of buildings somewhat vague in outline and made of glass, plastics and plywood, perhaps delivered completely assembled, the other half is engaged in the preparation of working drawings and specifications for buildings very much different from the ones they designed before the war.

What then is "modern" design? What physical differences can designers of buildings put their fingers on, which will distinguish the structures of 1946 from those of 1936? Is it a matter of flat roofs and corner windows? If it is, that isn't news; they have been around for some time. Is it new materials? If so we may have to wait over long, for professionals and constructors, when they are really honest, see no great change in the decade after the war in basic materials for permanent large construction.

But there is another aspect of the problem to be considered. Is there in the wind a changed attitude toward old materials? Can there be new ways of using them that deserve to be called "modern?" Can the engineer, the architect, the builder, approach a design problem with conceptions and design methods and construction systems that are radically different from the ones we have been used to? Fundamentally, can they cooperate and integrate their efforts to create something that can be called "modern" designs?" The answer is "yes", and the implications are worth noting.

New concept vs. tradition

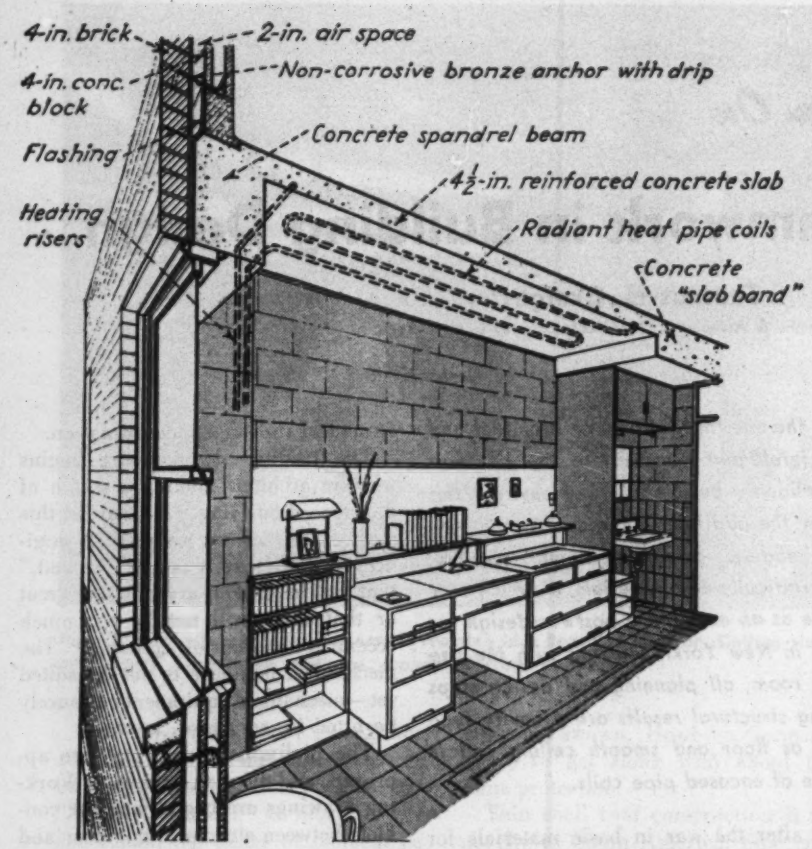
For example, among the projects designed for the armed forces and among the postwar buildings that are now being planned, there are some that stand out because of a new correlation of structural, architectural and mechanical aspects. They show a new feeling for efficient and economical use of basic materials. How did they get that way? To understand what modern design of buildings actually implies, let us first recall the traditional design process, and then examine a specific example of complete structural design coordination.

The traditional procedure begins with an architect making a sketch of a proposed building. He may, at this early stage, call on a structural engineer to make sure it can be "framed," that is, that spans are not too great or that there will not be too much eccentric loading of columns. The mechanical engineer is not consulted yet—mechanical equipment can surely be fitted in, somehow, later.

The preliminary drawings are approved, and the plan is frozen. Working drawings are begun, and the conflicts between structural engineer and architect are ironed out by compromise. Materials are chosen because of their appearance, with some consideration given to availability. Space is grudgingly granted to the heating and plumbing engineers for their equipment, and the electrical engineer is given predetermined space to light. The methods the builder may employ to carry on the operation of construction are left to him and his ingenuity.

The result cannot be anything startling. It will not necessarily be bad, because the same procedure has been followed many times, and improvements have gradually been made. But it will not be as good as it could be. Whether it is covered with Doric or Gothic ornament or none at all, whether it is "treated" horizontally or vertically, whether it is faced with brick or limestone, whether it employs hot water or steam heating, uses convectors or radiators, whether it is framed with structural steel or reinforced concrete—all these things are relatively unimportant. What is of prime importance is that it will be built with no conception of the possible unity of all its structural elements.

As an illustration of some of the things that can be accomplished when



Living requirements as to space and furniture influenced type of floor slab—no cross beams, thicker section over vestibule lavatory, encased heating coils and hidden supports—result of architect-engineer teamwork.

a unified design approach is realized, let us examine one of the postwar projects being designed under the direction of the Department of Public Works of the City of New York. At Bellevue Hospital there is required a Residence and School for Nurses, with rooms for 850 student nurses and 50 staff and faculty members, and with extensive educational, dining, and recreation facilities.

Integrating planning and design

The design for this complex program began basically with the individual nurse's room. Established at approximately 9x16 ft. in plan, the typical room was required to contain a lavatory and a wardrobe, a bed, a study table, and space for some occasional furniture. A reinforced concrete skeleton with monolithic slabs was designed in bays fitting the room size—two rooms to the bay in the longitudinal sense. Since a flat ceiling was desirable, cross beams were eliminated. A 4½-in. slab spans the space from wall to interior support. The lavatory and the wardrobe were organized at the corridor end of the room in such a manner that a thickened slab band, extending past the corridor partition into the room, lowers the ceiling only at this "vestibule" end of the room. Thus structure—basically and in detail—is related to, is fixed by, and literally expresses, the plan requirements.

A further correlation of design elements within the typical room is planned. Instead of a space-stealing radiator, radiant heating coils will be installed in the slab, which will become not only a structural means of spanning between supports, but a floor, a flush ceiling, and an integral heating unit. The structural system allows plumbing and heating pipe sleeves to be located in line with the columns, so that such facilities are built in where they should be and do not protrude into the room as though they were a last minute thought.

With this basic unit repeated along both sides of a corridor, the basis for the design of the upper or housing stories of the building is determined. Windows are large, the center portion fixed, with operating sash on both sides. They make for pleasant rooms, and at the same time they form a pattern on the exterior of the building, which requires no extraneous applied ornament. Nothing is forced; the elements are well organized and are not ashamed to stand honestly on their foundations. The important thing to note is that this general design and all of its architectural and structural details resulted from continuous architect-engineer teamwork.

The wall construction proposed is a cavity wall, 10 in. thick overall, made up of a 3¾-in. brick on the exterior, a 2¼-in. space, and a 4-in. concrete block on the inside. Both the architects and the structural engineer have had extensive experience with this type of wall construction, and together they have carried it to a carefully integrated conclusion. Since the entire interior wall—including the columns—is removed from contact with the exterior shell, the construction is weathertight, has good insulation value, is simple to erect, and is economical. Moreover, the inner wall, being isolated from weather contact, need not be plastered. Concrete block units will be used for interior partitions, and an inexpensive, integral, utterly frank finish will result.

Without going farther into the design of this building, it should be evident that an integration of design elements can achieve something much more satisfactory than uncorrelated methods ever did. The architects of the project, Alfred Hopkins and Associates, the structural engineer, Fred N. Severud, the mechanical engineers, Jaros, Baum and Bolled, and the clients, have found that working together from the earliest design stages, supplementing and unifying one another's work, rather than fitting in and compromising, is an exciting and a productive procedure.

Use what we have intelligently

No claim should be entertained that a building such as this is the last word. When the principles of a coordinated, imaginative approach are generally appreciated, the possibilities of modern design will be endless. There is no need to wait for new, untried materials. There is no need to hunt for outlandish attention-arresting designs. A great deal of work can be done in bringing together, for their fullest realization, construction ele-

ments that we all consider familiar. Inevitably it will be pointed out that such complete coordination is physically difficult. Architects and engineers are separate professional practitioners in most instances, and—let us be honest—they traditionally look down on one another's work. That this situation is not conducive to efficient design was recognized early in the war construction program, and contracts for technical services were given to architectural-engineering combinations.

Surely postwar design—private and public—deserves the same correlated services. How can it be achieved? Ideally, perhaps there should be individuals who are neither engineers nor architects, but designers of buildings. Actually, although there are a few such persons, the tremendous amount of technical knowledge and ability required makes such an ideal impractical. The next best solution would seem to be an organization composed of experts in all branches of building design, working in an integrated manner under an executive head. Such architectural-engineering firms exist, but in many cases one branch or another of their services tends to become predominate.

In any event, not all of us wish to become absorbed in large, impersonal organizations. And even if physical closeness and unity were established, there still would be required full understanding of one another's part in the production of the completed building. That does not necessarily come from working in the same office. The suggestion is even being revived in some quarters that the designers of buildings—the architects-engineers—should also act as general contractors, and carry the physical collaboration to it ultimate conclusion. Again there is precedent for such an arrangement. But again, either design or construction efficiency tends to become subordinate.

No organizational arrangement can provide the complete answer. A new conception is required—not simply of cooperation or of collaboration—but of full integration. With such an understanding of the unity of building design, postwar structures can be very different from prewar. Materials can be selected for use on the basis of structural fitness, appearance, finish, availability, economy. Construction systems can be chosen, not imposed, according to their appropriateness, soundness, economy. Mechanical equipment can be integrated with the structure. Walls and floors can be designed to act fully as structural members, at the same time that they serve equally and efficiently to enclose and subdivide architectural spaces.

To many architects, engineers, and builders the prospect is exciting. Architectural engineering begins to mean something quite different from adding Doric ornament to steel columns. Building construction begins to mean something far beyond the taking off of quantities and the letting of subcontracts.

An Engineer's View On

Effective Teamwork in Building Design

Fred N. Severud
Consulting Engineer
New York, N. Y.

THE CONCEPTION of architect, engineer and builder working in an integrated manner toward the common goal of good buildings, as discussed by Mr. Creighton in the previous article, broadens the structural designer's function beyond the limits he has become accustomed to. He becomes part of a team, as he and his colleagues leave behind the crude methods of solving problems independently in the different but connecting fields.

He begins to think of his part in the composite job as including:

1. The provision of floor space with a suitable finish, sheltered from the elements with a minimum of future maintenance costs.

2. The design of exterior and interior wall and ceiling surfaces with a satisfactory appearance, as well as with structural value.

3. Integration, with the mechanical engineer and the architect, of mechanical and structural requirements.

4. Evaluation of human factors, such as the imagination of the architect, the personality of the owner, the ability and efficiency of the contractor. He faces the necessity of considering functions as well as formulas.

5. Knowledge of construction methods and the manner in which contractors prepare their estimates.

6. Appreciation of the economies inherent in the use of proper materials and construction methods that harmonize with the requirements.

In fulfilling these enlarging functions the engineer is aided by the fact that former approximate design methods are being abandoned in favor of analyses that give the designer a much more accurate picture of the real behaviour of his material than he has had before. He feels—if he has imagination enough—the pulling and pushing that the materials go through to bear up under the loads they are asked to carry. By changing the proportions of the various framing members, he finds that even the stresses can be changed, since large members will absorb a greater amount of stress than small members.

Conceptions such as this have opened up possibilities for greater improvement in many common methods of construction by making the designer a more skillful artist in the use of materials.

Even in the design of such a simple and apparently stereotyped thing as a concrete floor slab, the combination of progressive structural and architectural thinking leads to new concepts. This is well illustrated by the design of the Residence and School for Nurses at Bellevue Hospital, described in the previous article. There it was decided that there was no reason why the structural slab could not be finished directly and covered only with a thin asphalt tile surface to make walking easier. Moreover, the mechanical engineers and the architects agreed that mechanical work—even the pipe coils for radiant heating—could be completely installed in time to be buried in the structural slab. This concept, of course, eliminated the usual detail of slab, fill and separate finish.

Slab design as a matter of logic

Then the question arose as to the design of the slab itself. In a structure of this sort—rooms on either side of a central corridor—the columns are logically placed along the outside wall and the corridor partition. But, once the scheme of beams perpendicular to the walls is discarded, what is the ideal configuration for a concrete slab spanning between these columns? What is the simplest and most efficient design?

Fig. 1, (a) illustrates approximately an ideal outline. It may be that concrete buildings of the future will have such curved ceilings, but at the present time practical construction requires straight lines. Fig. 1 (b) and (c)—disregarding for the moment the exterior wall design in these illustrations—show a type of construction that follows closely the ideal concrete outline, but comes closer to practical attainment. The curvature would be formed by shiplap boards in one case, by short runs of straight surfaces in the other. With the present situation in building materials and labor I would not advocate any of these three types of design; but I would like to stimulate progressive thought and confidence in the belief that not too long from now, as a result of coordinated effort, construction difficulties will be overcome and the distribution of material will be made in more direct proportion to functions.

In the case of the Bellevue project, a perfectly flat ceiling was considered desirable for the efficient operation of the radiant heating pipe coils. The design adopted, illustrated in Fig. 2, included a pair of 4-ft. slab bands bordering the corridor walls. Columns are set away from the corridor partitions, a scheme which the architectural arrangement of the room makes possible. This allows the columns to be centered on the slab band, and the slab band to be of a width exactly equal to the "vestibule" of the repetitive room plan.

A 4½-in. flat slab spans from the spandrel beam at the wall to the slab band, and encases the radiant heating pipe coils. Architect, mechanical engineer and structural engineer are mutually satisfied. Structure, plan and equipment are all well served.

The structural principle involved in the use of the slab band is illustrated in Fig. 3. Without going into all the technical aspects involved, a comparison is made in this figure of the moments in "slab band" construction and those in conventional slab-and-beam construction. Due to the greater stiffness of the slab in connection with the slab band, the initial negative moment m_2 is greater than the conventional M_2. However, the critical section for these moments is where the slab joins the supporting member. At this point m_3 is considerably smaller than M_3. It can readily be seen that the positive moments with slab band design are smaller than those in ordinary design.

For both negative and positive moments, therefore, the slab band method is quite superior. This might be expected, for the conventional slab-and-beam construction was adapted from forms demanded by rigid, inflexible materials, at a time when little consideration was given to the proper distribution of materials.

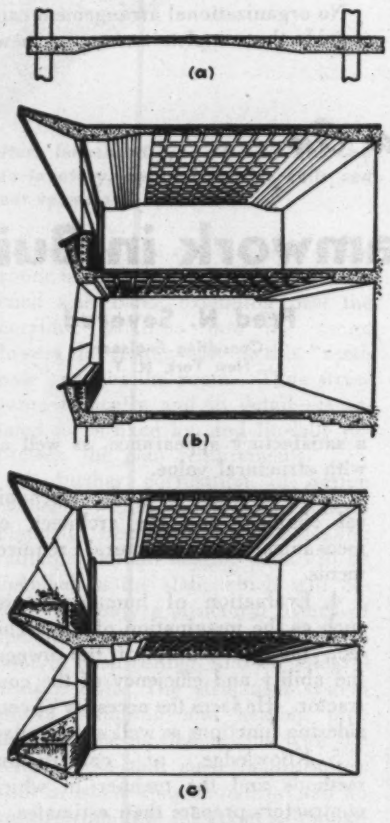


Fig. 1. Suggestions for slab and wall designs that stem from logical use and distribution of material. (a) shows ideal slab form and (b) and (c) practical variations as well as special concrete wall designs to give effective weather protection to the concrete.

Interesting slab variations possible

Where radiant heat pipes are not required, filler blocks may be used in this type of design to provide economies by lightening the floor construction. In this case, another question would present itself to the architect-engineer team. Why should it be necessary to plaster these blocks, as is commonly done? We have been brought up under plastered ceilings, and we have taken it for granted that flat plaster is a desirable surface, but is that necessarily so? In all natural things, irregularity rather than regularity is the rule.

"But," you will say, "surely we cannot accept the drab and ugly finish of a rough concrete slab for the ceilings of important buildings." Not for the present, perhaps, but the time will come when, with some skill, we shall be able to produce a pleasing concrete surface just as it comes from the form. In the meantime, by using the filler blocks and arranging them in checkerboard fashion with the concrete ribs between them, an interesting pattern can be achieved. The irregularities in the placing of the blocks and in the ribs, resulting from imperfections in the form work, combine to make an interesting surface. By using pigments to color the blocks and the intervening ribs, attractive color schemes can be developed. Furthermore, the blocks will absorb about 20 percent of room noises.

A cavity wall was selected for the

Bellevue project as satisfying the requirements of economy and permanence. With the architects, I feel that such construction—brick used frankly as an exterior shell, unplastered concrete block used frankly as the inner wall—is intelligent utilization of structural materials. No applied finish is necessary; insulation and weathertightness are inherent in the construction; the wall is structurally sound, with proper reinforcement and anchorage.

Architectural concrete walls

Other equally honest wall designs should be possible. There are many architects who would like to use concrete exterior walls, and clients are often interested because of the economy implied. Engineers may be more than willing, but there is the drawback that the present type of concrete construction is not very suitable for the climate of the northeastern United States. The principal reason for deterioration of concrete in such a climate is the wetting and drying of the walls and freezing action while they are wet. If it should be possible to shelter the walls somewhat from the elements, then concrete construction in rigorous climates could be accomplished as successfully as in the southern and western regions. Again, combined professional imaginations would have to be put to work.

As an example of the sort of design that might result from these considerations, let us examine Fig. 1 again. Here in (b) is illustrated an overhang at the roof level, which affords protection to the lower wall. As an additional safeguard, the spandrel walls below have been slanted outward, and the window sill has been so arranged that any great driving rain will be shed. The scheme would be unusual, but it is perfectly logical in rough climates. The sloping spandrels readily accommodate the heating requirements, and the sloping glass lends interest to the room.

Fig. 1 (c) indicates a further step. The greater overhang at the window is desirable from a structural standpoint since the loading at this point will relieve the interior spans. In addition an ideal place has been found for interior planting.

There will be great changes in wall design in the near future. Many prefabricated and semi-prefabricated

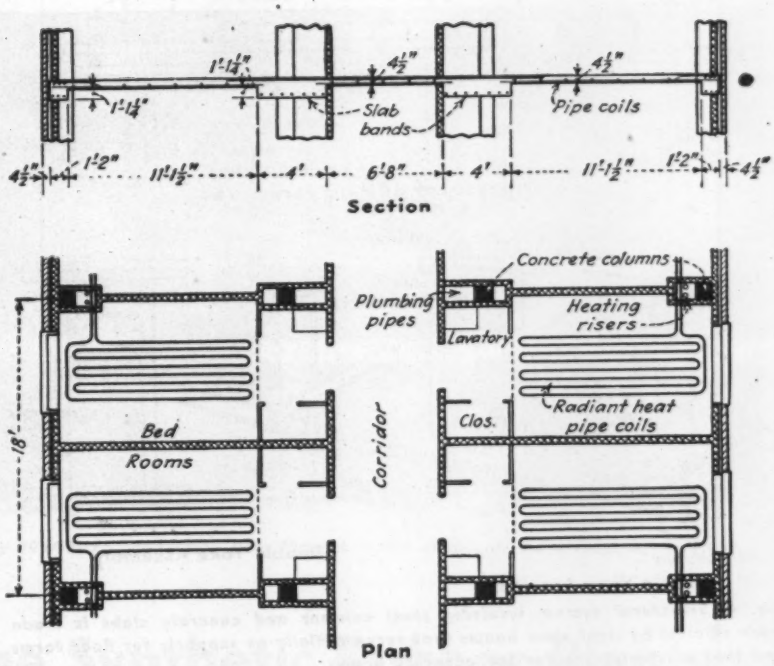


Fig. 2. Typical bay framing in Bellevue Nurses Home in New York utilizes a slab band instead of a beam, so placed as to be inconspicuous in the room. Heat coils are buried in 4½-in. floor slab.

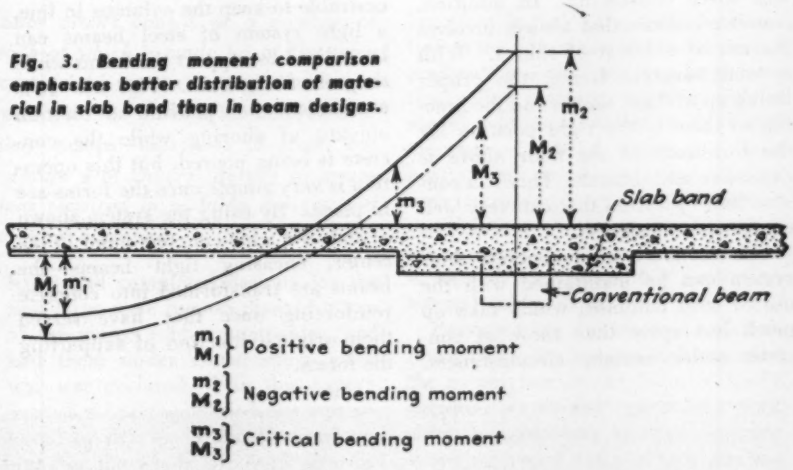


Fig. 3. Bending moment comparison emphasizes better distribution of material in slab band than in beam designs.

panel designs will meet the requirements of a modern wall, in addition to simpler constructions built in place. We are just beginning to realize that the heavy building walls of great load-carrying capacity are no longer justified with skeleton frame structures. In a contemporary building the basic functions of an outside wall are simply protection from the elements, from noise and from fire, minimization of heat transmission, and resistance to wind forces and their transmission to the skeleton frame. The simple cavity wall proposed for the Bellevue project, with its two unfurred masonry wythes, is a large step in the right direction.

Cooperating with the builder

Many other illustrations could be cited to show the sort of thinking that collaborative professional enterprise will induce. When the contractor is brought into the picture as well, further stimulation is provided.

For some buildings a serious modification of concrete design might be advisable, in order to avoid some of the builder's difficulties with this material. When concrete columns are

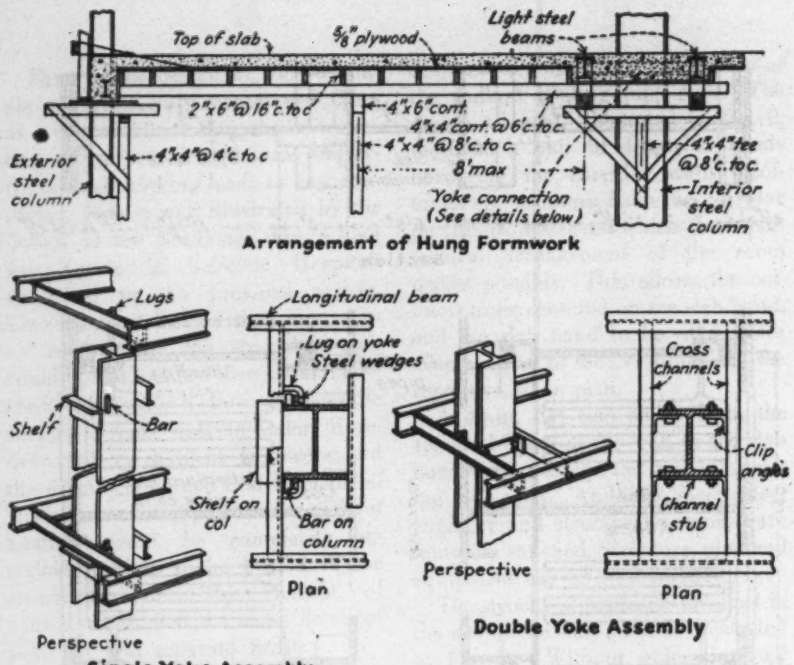


Fig. 4. Structural system involving steel columns and concrete slabs is made more efficient by light steel beams that serve initially as supports for floor forms and then as reinforcing for the concrete beams.

used in buildings more than ten stories high, they become very clumsy and space consuming. In addition, concrete construction always involves the use of a forest of shores. With a total concrete frame, the proper lining up of these shores and the bracing of them in the right position for the formwork of the floor above is expensive and difficult. This is a construction operation that can very well concern the designer.

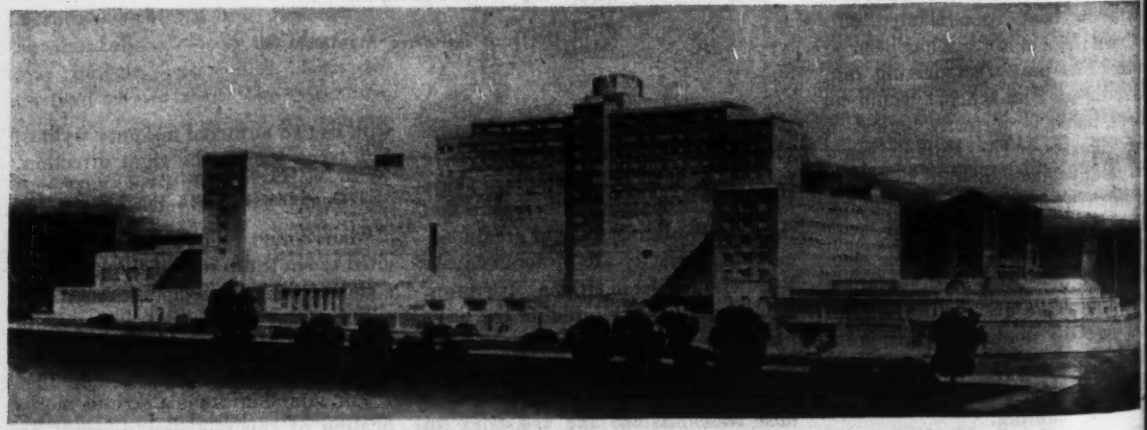
The economy of a concrete floor system can be maintained with the use of steel columns, which take up much less space than those of concrete under certain circumstances. And since, with the steel columns, a certain amount of light bracing is desirable to keep the columns in line, a light system of steel beams can be utilized to support the forms while they are being built. (Fig. 4.) It is economical to provide a certain amount of shoring while the concrete is being poured, but this operation is very simple once the forms are in place. By using the system shown —that of a wide concrete band in the center, encasing light beams—the beams are transformed into concrete reinforcing once they have served their original function of supporting the forms.

The connection of these cent beams to the columns can be effect very simply, as shown in Fig. 4, wi either single or double yoke asse bly. By a wedging arrangement, shown for the single yoke detail, minimum amount of field work required in erecting the steel fram

In other ways design and constru tion can be integrated. The span the beam can and should be ma to utilize standard sheets of plywoo and the drop between the slab a the band can be accommodated standard lumber sizes.

As another example, a concre column is always thought of as square member. Only occasionall where dictated by special consider tions, is a rectangular column use The result is that the column for for one floor must be entirely ripp apart to fit the smaller columns abo The sensible thing to do is to use column form with a constant widt and varied lengths, made to fit stand ard lumber sizes. In this manne only one end of the column needs a justment, and great savings are ma possible.

When a man is in danger, he di covers miraculous powers. So wit a nation in danger. Miracles hav been performed during the stress o the past few years. Although per manent construction has not been i the forefront of the battle, it is obvi ous that it will be affected by the in dependent, progressive thinking tha this period has required. We mus be forewarned and be on the alert All the old wasteful methods will g by the board. A new conception i dawning—the integration of th whole building operation.



Residence and School for Nurses at Bellevue Hospital, New York—a product of architect-engineer teamwork in which the living room, sketched on p. 130, comprises the basic design unit for all floors above the first.

Fig. 1. Typical rubber plant with three 30,000-ton production lines through which chemicals move from left to right.

Designing the Synthetic Rubber Plants

***atents in Brief**—All synthetic rubber plants consist of a number of ndard 30,000-ton production units, each of which is made up of the same e structures. Heavy reinforced concrete rigid frames support the larger ipment. Operating floors are designed to aid the installation and removal large tanks. Most equipment—piping, pumps, tanks,—is of steel, but ge vacuum tanks are of a concrete design with unusual details to assure and-water-tightness. Special provisions required in building designs and lectric power and lighting layout to avert explosions.*

ATION IN WARTIME of a major and rely new American industry—that the manufacture of GR-S rubber, s it was originally known, Buna-S ber—was naturally attended by a round of problems. Not the least hese related to the design of the dings and other structures that e up a synthetic rubber plant. for the most part the problems lved reinforced concrete since conservation measures pre- ed the use of steel and other cri- materials except for necessary pment. Since all of the GR-S ts, with the exception of the first privately designed units, were to a standard unit design de- ed by the Blaw-Knox Division e Blaw-Knox Co., in cooperation the rubber companies and gov- ent experts, this article is a re- of that organization's work.

ell before Pearl Harbor, Blaw-Knox had completed designs for the first large-scale Buna-S plants for two of the major rubber companies, and had them under construction when war was declared. With this experience as a backlog, Blaw-Knox was selected to develop a standardized design for the whole program. The result was a standard production unit of 30,000 tons capacity, which could be used singly or in multiples to provide plants of various sizes. A brief description of the manufacturing process in one of these units will serve to emphasize the place and purpose of the structures and equipment involved.

How GR-S rubber is made

Buna-S is a copolymer made up of the hydrocarbons butadiene (derived from petroleum or grain alcohol) and styrene, a synthetic of coal tar origin. These raw materials may be made in adjacent plants or brought to the rubber plant in tank cars. After purification of the butadiene, the two main ingredients are charged into large kettles, called reactors, together with a soap solution, water and small amounts of special chemicals. After heating and agitation of the mixture under pressure, a copolymerization or combination of the molecules takes place, resulting in an emulsion that is termed latex since it is similar to natural rubber latex.

Passing from the reactors to blowdown tanks, the latex, which contains the co-polymer in the form of finely divided emulsified particles, goes through a recovery system involving stripping towers and pumps where unreacted butadiene and styrene are removed and recovered for recycling. The "stripped" latex is then treated with an anti-oxidant and pumped to storage tanks from which it is continually drawn for the next step in the process—coagulation.

The addition of sulphuric acid and other chemicals causes the emulsified rubber particles to coagulate and form larger masses, which may readily be separated from the liquid. The slurry is filtered, and the filter cake, after being shredded in a disintegrator, is hot-air dried, weighed into uniform batches and passed through a hy-

Fig. 2. Reactor tanks (right) and blowdown tanks (left) are housed and supported in a concrete rigid frame building. Reactors are carried on diagonal beams framing a square opening, the corners of which are filled with precast panels.

draulic press to be formed into bales.

This finishes the manufacturing process except for disposal of the filter liquid. Since this contains some coagulated latex, which it is desirable to recover, it is passed through a vacuum tank, known as an "evactor," and similar to the "vacuum flotation" units found in some sewage plants (*ENR*, Feb. 25, 1943, vol. p. 297). The filtrate, previously aerated, when exposed to a vacuum gives up the fine rubber particles, which are floated to the surface in the vacuum tank and removed by mechanical means.

Three principal structures or groups of structures required in these special steps have particular structural interest: (1) the housing and supports for the reactors and the blowdown tanks; (2) the pump building and the tank supports required in the recovery system where the unreacted styrene and butadiene are stripped from the latex; and (3) the vacuum tanks which were built of reinforced concrete.

Building houses heavy tanks

The reactor building appears in each of the three 30,000-ton production lines or "units" of Fig. 1 as the structure with two white gabled roofs and the flat roof between. It provides housing and support for 24 reactor tanks 8 ft. in diameter and 13 ft. high weighing 30 tons each when full, and for 12 blowdown tanks 10 ft. in diameter and 15 ft. high weighing 42 tons when full. Since pumps and other equipment were also required, it was decided that the most efficient layout would be provided by a U-shaped building, with the tanks in the legs and the utilities, etc., arranged across the base of the U. (In Fig. 1 the two white gabled roofs mark the legs of this U-shaped building).

In the design of this building as well as of all other reinforced concrete structures in the synthetic rubber plants, three loading conditions were analyzed: (1) dead load plus wind on the sides of the totally inclosed building; (2) operating load plus full live load plus wind; (3) full test load without wind. The latter condition always determined maximum foundation load since it assumed all equipment filled with water whereas in operation the system is only partly filled.

The structures were designed as rigid frames. Moment distributions were made for several longitudinal and several cross sections of the reactor building, and from the results similar members were sized, the largest of a particular group being selected. Thus the columns in each longitudinal row and the beams in each longitudinal bay were made alike, a policy of uniformity that greatly simplified forming and bar bending.

The reactors are hung from an operating floor placed 25 ft. above ground level, and while this provided gravity flow to the blowdown tanks and headroom underneath for pumps and piping, it complicated the installation problem, since the heavy tanks had to be lifted through openings in the floor and then supported on the edges of the openings. The solution was to provide square openings in the operating floor slab framed with diagonal beams upon which the bearing lugs of the reactors could be supported (Fig. 2). The reactors were lifted through these openings (the lugs coming up through the corners), rotated 45 deg. and set down on the supports. Precast slabs were then dropped into the corners, giving a smooth floor surface, yet providing for easy removal of a reactor if required.

The blowdown tanks are carried on footings independent of the building and for them, too, an elevated operating platform is provided although only 15 ft. above the floor. The inside half of this platform is a continuous concrete slab, but the outside half is steel grating on light structural members the whole of which can be removed to allow the tanks to be moved in or out through the sides of the building.

Corrugated cement-asbestos board is used for both roofing and siding although in locations where weather permitted (Fig. 1) the siding was sometimes omitted.

Special care was used in designing the control room in the reactor building because some material flowing through the instruments is highly explosive. A forced draft ventilating system delivering twenty air changes per hour is provided and the rooms are built with concrete roof slabs and brick walls. To prevent permanent injury to the rooms in case of an explosion, blowout panels of glass blocks are used for windows, and an explosion hatch is placed in some of the roof slabs.

Long span rigid frames

After the latex leaves the reactor structure, it goes to the recovery building where the unreacted butadiene and styrene are removed or "recovered" in stripping columns or towers. In each of the production lines of Fig. 1 this building appears as a mass of exposed piping. Actually it consists of two adjacent structures: an enclosed pumphouse with two open floors and equipment above, and an adjacent frame for supporting the stripping towers.

th of these structures were also
ned as rigid frames. The prin-
problem involved in the pump-
e was to support heavy loads over
g span in order to leave unob-
ted floor space for the installation
uipment. The pumproom, there-
has a clear span of 32 ft. made
ible by designing the slab above
rt of a T-beam system in which
tems have the substantial dimen-
of 24x42 in. The tapered col-
of the rigid frames (Fig. 3)
considered as pinned at the
nd floor. Members supporting the
floor are slightly smaller since
loads are lighter and the side
t is not so great.

he supporting slab for the strip-
towers (each tower 9 ft. in diam-
by 50 ft. high and weighing 116
when full) was made level with
umphouse second floor and sepa-
d from it by a 1 in. asphalt joint.
supported by four columns and
use the towers are close together
lab was made continuous, giving
ontal rigidity to the structure
also serving as an operating plat-
. Concrete stairways are carried
eams cantilevered from the col-
s, a practice that provides fire-
f facilities of neat appearance
out sacrificing valuable space in-
the process area.

Vacuum tanks of concrete

lthough the other buildings in the
uction lines of Fig. 1—those at
eft or front end housing the soap
chemical mixing operations and
at the right the coagulation proc-
baling and shipping—are of con-
ional reinforced concrete design,
is one auxiliary structure whose
n and construction was quite out
he ordinary. This is the evactor
. 4) in which rubber particles
reclaimed from the used filter
id. Ranging in size from 22 ft. to
t., inside diameter, and from 15
7½ ft. clear inside height (at the
ous plants) these flat-bottom and
e-roof reinforced concrete tanks,
h were to operate under approxi-
ely 10 in. of vacuum, had to be
ned not only with sufficient struc-
l strength but also to resist air
water leakage.

he bottom slab was designed as a
footing supporting the entire tank
capable of resisting both direct
r pressure and uplift due to the
um. The tank walls were de-

Fig. 3. Concrete rigid frames span 32 ft. across recovery building pumproom and support two open floors of equipment above.

signed as thin shells, with no bending stresses considered other than some small ones developed by loading eccentricities. Specially designed sliding joints at top and bottom were provided to prevent transfer of moment to the wall from the bottom slab and from the dome.

Wall thicknesses of the evactors range from 7 in. for the 22 ft. dia. tanks to 12 in. for the 40 ft. tanks. These thicknesses keep the tensile stress in the concrete under 10 percent of the specified concrete strength (4,000 lb. at 28 days), which it is hoped may eliminate cracking. However, the hoop reinforcing steel is designed to carry the full hydrostatic test pressure with cracked section, and unit steel stress is held to 12,000 lb. so that if cracking should occur the openings will be small.

In each tank, except the largest, the reinforcement was placed in one layer at the outer face of the wall, to facilitate better compaction of the concrete at the inside face, where a dense impervious surface is essential for resisting chemical attack, and to keep the steel as far from the chemical solution as possible. Although compressive stress in the walls due to vacuum is negligible, the thickened sections for the joints at top and bottom and the monolithic effluent gutter serve as stiffening ribs. Except in the 40 ft. tanks, no joints were permitted in walls. These large tanks, however, have four vertical joints, to minimize temperature and shrinkage cracking, and in addition a layer of shrinkage steel is used at the inside face.

The covers are spherical domes ranging in thickness from 4 in. on the 22 ft. to 9 in. on the 40 ft. tanks. The radial thrust of each of the domes is resisted by the tension in a ring girder. Except at openings, the dome reinforcement is for temperature and shrinkage only. Two manholes in each dome are designed as pipes loaded with the dome thrust. The weight of the equipment on top of the dome was taken into account in the design, but is negligible compared to the load due to vacuum, which approximates 1100 lb. per sq.ft.

The necessary articulation between walls and bottom and dome is provided by the sliding joint detail shown in Fig. 4. Graphited sheet asbestos packing continuous on each side of each 9-in. water stop serves as a contact surface for sliding. Asbestos was selected in preference to metals because it is less subject to chemical attack and has a low coefficient of friction. Hoop bars were added at the top and bottom of the walls to take care of forces transmitted across the joints by friction. To prevent excessive creep of the wall, continuous concrete lips were cast on the outside of the bottom and on the inside of the top. Asphalted felt was placed between these lips and the wall to break the bond and allow some movement to take place. Rubber was selected for

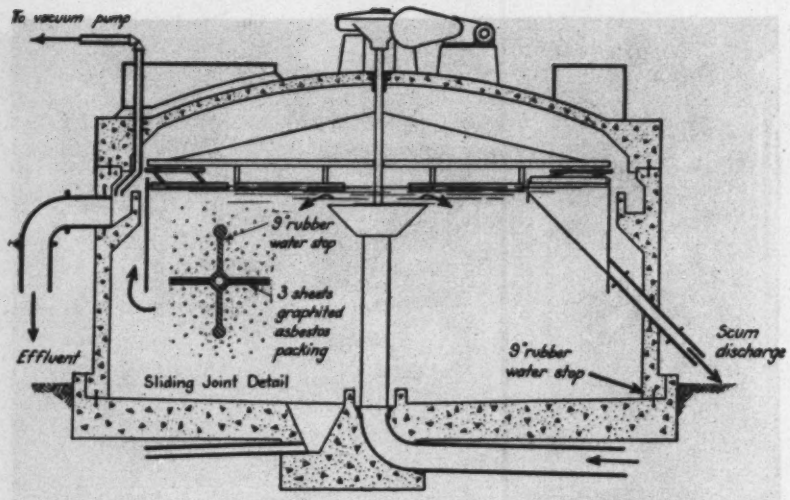


Fig. 4. Requirements for both articulation and watertightness had to be met in concrete vacuum tanks where fine particles of rubber are reclaimed from the filter wash water.

the water stops both because of its resiliency and its resistance to chemical attack. The hole in the center of the water stop allows a slight movement to take place between the members of the joint without danger of shearing off the rubber.

The vertical joints in the 40 ft. diameter tanks have 6 in. rubber water stops, which were made without the perforated center bulb since a shearing movement cannot occur in this location. A mechanical connection was made between the 6-in. vertical and the 9-in. circumferential water stops by bolting the two together between steel plates after first cutting off the bulbs on the edge so as to obtain a flat contact surface. The ring girder in the 40 ft. diameter tank also had four vertical joints and these were constructed with 6-in. water stops, which were extended a short distance into the dome.

A circumferential contraction joint between the dome and the ring girder was provided in the 40 ft. diameter tank to relieve shrinkage of the dome. After the dome concrete was seven days old and before the forms were removed, this joint was packed with stiff iron filing mortar to within 1 in. of the top, while the remainder was filled with a plastic caulking material to insure tightness of the joint. When loaded, the dome tends to flatten and seal this joint by compression.

In the construction of these tanks every effort was made to secure dense concrete. Most of the 7-day test cylinders equaled the strength specified for 28-day cylinders. Absorptive form liner was used on all wall surfaces both inside and out. Removable form tie bolts were not permitted. Snap ties were used on the earlier jobs but water seal form ties were required on later tanks. Cut-off collars were welded or brazed to all pipes and manhole frames passing through the walls and domes. All concrete was cured with a clear membrane curing compound since satisfactory water curing was a practical impossibility on these rush jobs. Normal portland cement was used throughout the program. As a chemical resistive precaution, however, the use of non-calcareous aggregates was required on the later tanks.

Surfaces formed against absorptive liner received no finishing other than necessary patching and removal of panel marks. The tank floors were given a hard trowel finish to facilitate painting, and the domes received a wood float non-skid finish. The inside sides of all tanks were sprayed with four coats of synthetic resin paint. This paint was applied using the membrane curing compound as a primer before the curing compound had started to loosen. Since the curing compound and the paint use the same or similar solvents this treatment utilized the tough initial bond of the curing compound to the concrete against the tendency of the vacuum to blister the paint film.

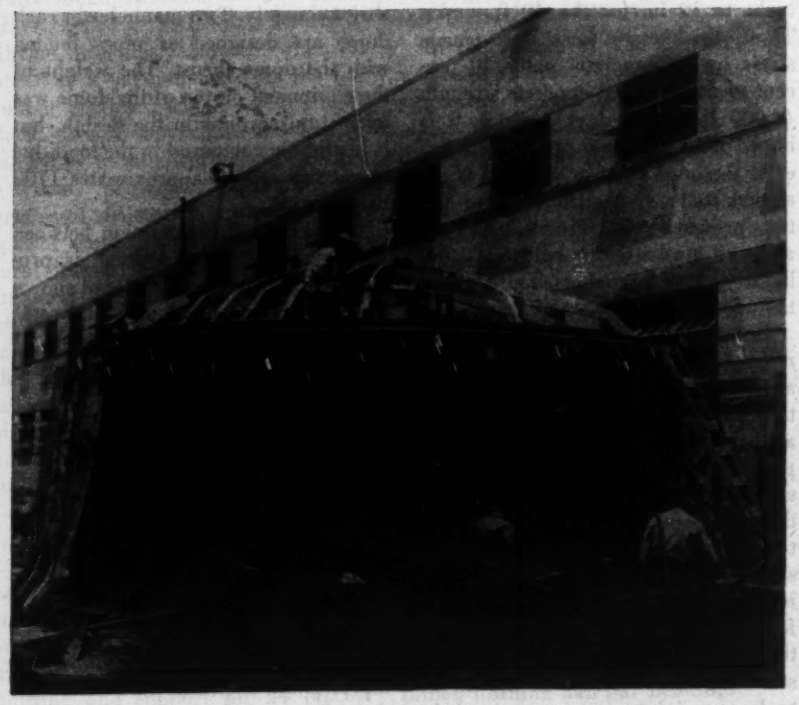


Fig. 5. Placing forms for dome of vacuum tank. Note the rubber water stop on top of wall. Discoloration of concrete results from curing compound.

Equipment design

In addition to these design problems of a strictly structural nature Blaw-Knox engineers had many others to solve with respect to process equipment and plant facilities. A

gh the majority of these are of cern only to the synthetic rubber cialist, a few have general interest. or example, in the design of the tors and the stripping towers it found that rubber does not adhere eadily to glass as to steel, and as a sequence these tanks are lined with mel. Moreover, such lining pro- ed necessary corrosion resistance ordinary carbon steel. This ex- ient, however, could not be used the agitators in the reactors, and e had to be chrome plated for cor- ion resistance.

roviding necessary electric service power and lighting also presented cial problems, first because explo- conditions are present in 50 per- t of the plant area and second be- e it was necessary to work under t limitation orders governing the of copper and steel.

ll load distribution centers were ted in non-hazardous parts of the nts, and were elevated 25 ft. above grade to reduce fire hazard and to provide protection against floods when required. Each 30,000-ton plant unit has four such load distribution centers consisting of a 1,000 kva. transformer, a 440 volt secondary bus, and metal-clad switch gear with air circuit breakers and motor control centers.

A common system for both power and static grounding was used wherever possible, with copper weld cable for the former and galvanized steel cable for the latter. Since most of the process piping is welded it was necessary to supply jumpers only where mechanical joints prevented proper connections.

In the design of the plant lighting system, every third lighting fixture was equipped either for emergency or blackout lighting depending upon the location of the plant with respect to blackout regulations. With this arrangement lighting units can be used for any one of three requirements, necessitating only one panel board for emergency or blackout service.

A separate feeder for the emergency lighting panel board and future automatic throw-over to an emergency source was installed in spite of the fact that no emergency source of current was permitted for any of the plants. This will allow future installation of emergency power supply with a minimum of effort.

Blackout lighting was accomplished by reducing the voltage at the emergency distribution panel board to 25 volts by means of auto-transformers with taps at 20 and 30 volts. This reduced voltage applied to a 200-watt lamp produces a light intensity equivalent to starlight on a clear night. These particular lights have dome reflectors with the filament obscured from any point more than 10 degrees below horizontal. Incandescent lighting was used throughout, employing prismatic lighting units in the non-hazardous areas and regular explosion proof units elsewhere.

Waterproof Parapet Walls

Arthur Wardell Consoer

Consoer, Townsend & Associates, Consulting Engineers, Chicago, Ill.

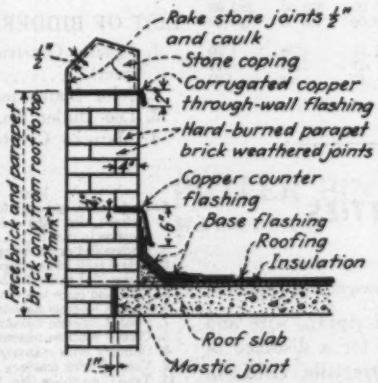
ome simple elements of design and struction are a frequent source of ation and embarrassment to the ineer or architect. Not the least he many petty annoyances in the fessional life of the author have n troubles incident to proper con- ction of parapet walls. Others in profession may appreciate the fol- ing suggestions:

t is the author's present practice to ew the use of so-called hard mor- and to place faith in full mortar ts (horizontal and vertical) of tland cement with not more than percent of lime. It is important to mortar and brick and stone that bond and to test out this point in field before much mortar is used. weathered joints; do not wash n parapet walls with acid.

Absorption tests should be made on brick used throughout the wall. Do use brick with absorption of more n 10 percent. Do not use soft brick enter of wall; particularly do not soft brick for back facing of the l.

or extreme weather conditions e out all mortar joints above the roof line on both faces of the parapet wall to a depth of ½ in. while soft. After mortar remaining is dry, coat the exposed joint with shellac, and then caulk with approved caulking compound of proper color to match mortar joints below.

Flash skillfully. On low parapet walls not over 2 ft. high carry adequate felt base flashing from roof up on inside face of the wall to under side of through-wall flashing under cap stone. Through-wall flashing to be corrugated copper laid in mortar, turned down at least 6 in. over base flashing and extended to a point close to outside face of the wall where capstone is flush with face of brick wall. On high walls build counter flashing into wall to a depth of at least 4 in. and to a height of at least 12 in. above roof line. Install cant strip at least 4 in. high at intersection of roof and parapet and provide adequate saddle or fillets to avoid pockets at walls. Provide fully flashed scupper openings above counter flashing in addition to good roof drains. Do not depend on slight insertions of the flashing regardless of whether it is felt or copper flashing. High walls cannot ordinarily be flashed all the way up where wall may be exposed to heavy wind. Such flashing is not needed if the parapet walls are laid up properly.



Parapet wall construction that has proved successful in preventing leaks.

Where stone capstones are used over a brick wall, do not let brick and stone be bonded. They expand at different rates. In long walls, provide watertight expansion joints for both brick work and capstones. Avoid thrusts from roof slabs against parapet walls. Provide expansion joints where needed to dissipate such thrust.

If leakage develops in a parapet wall, repair all bad masonry and joints, rake and recaulk face joints, and check flashing and expansion joints.

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

HIGHWAY SURFACING
WISCONSIN

OWNER: State Highway Commission of Wisconsin, Madison. J. A. Stransky, division engineer.

PROJECT: Portland cement concrete surfacing 1.0 mile of S.T.H. No. 62 in Milwaukee County, between South Milwaukee and Milwaukee. Includes necessary clearing, grubbing, removing old pavement and structures, 9-in. concrete pavement, drainage facilities, culverts, combination concrete curb and gutter, sidewalks, and concrete safety islands.

CONDITIONS: Contractor to furnish all materials and complete work in 130 working days. Rail and highway transportation facilities available. Labor scarcity exists in area due to proximity of industrial section of Milwaukee, West Allis and other smaller manufacturing cities. Wage rates are: skilled labor, $1.60 per hour; semi-skilled, $1.40; and common, $1.05.

BIDS: Five bids were received June 27, 1944, ranging from the contract low of $228,810 to $248,029.

LIST OF BIDDERS:

1. Kramp Constr. Co., Milwaukee, Wis. (contract) $228,810
2. Koch Constr. Co., Milwaukee, Wis. 230,263
3. Milwaukee General Constr. Co., Milwaukee, Wis. 231,541
4. E. & C. Co., Milwaukee, Wis. 245,590
5. R. R. Birdsall & Sons Co., Racine, Wis. 248,029

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing	454 in. dia.	$1.50	$1.50	$0.60
2. Grubbing	454 in. dia.	2.00	1.50	.60
3. Remove old pavement	25,752 s. y.	.45	.40	.50
4. Remove curb and gutter	161 l. f.	.25	.25	.25
5. Remove concrete sidewalk	1,274 s. y.	.35	.30	.30
6. Remove catch basins	6 ea.	56.00	56.00	50.00
7. Remove 12-in. concrete wall	68 c. y.	7.00	7.00	5.00
8. Unclassified excavation	4,338 c. y.	.90	1.00	.75
9. Sand-gravel fill	741 c. y.	1.45	1.75	1.50
10. Concrete pavement, 9-in	29,286 s. y.	2.73	2.78	2.80
11. Concrete pavement driveways	375 s. y.	2.90	3.10	2.70
12. Concrete spillway	1 ea.	1,500.00	1,500.00	1,300.00
13. Fiber conduit, 3-in	22 l. f.	1.00	1.00	.90
14. Conduit, 2-in	135 l. f.	1.00	.85	.80
15. Pipe underdrain, 6-in	105 l. f.	3.85	3.85	3.85
16. Non-rein. conc. sewer pipe, 8-in	974 l. f.	3.75	3.75	3.75
17. 24-in. rein. conc. sewer pipe	50 l. f.	10.85	10.85	10.85
18. 27-in. rein. conc. sewer pipe	2,577 l. f.	12.00	12.00	12.00
19. 33-in. rein. conc. sewer pipe	1,221 l. f.	11.50	11.50	11.00
20. 12-in. rein. conc. culvert pipe	1,530 l. f.	4.80	4.80	4.80
21. 15-in. rein. conc. culvert pipe	1,328 l. f.	5.00	5.00	5.00
22. 18-in. rein. conc. culvert pipe	1,890 l. f.	9.80	9.80	10.80
23. 18-in. rein. conc. culv. pipe, cradled	198 l. f.	22.00	22.00	22.00
24. 24-in. rein. conc. culv. pipe, cradled	137 l. f.	24.00	24.00	24.00
25. 18-in. encased rein. conc. culv. pipe	15 l. f.	22.00	22.00	22.00
26. Catch basins, Type A, special	44 ea.	186.00	186.00	196.00
27. Catch basins, Type B, special	1 ea.	280.00	280.00	280.00
28. Manholes, special	33 ea.	185.00	185.00	190.00
29. Conc. combination curb and gutter, 22-in	10,880 l. f.	1.35	1.38	1.30
30. Concrete sidewalk, 5-in	26,850 s. f.	.27	.29	.28
31. Concrete safety islands	182 s. f.	.60	.56	.50

ROCK MATTRESS, JETTIES
CALIFORNIA

OWNER: California State Division of Highways, Sacramento.

PROJECT: Construction of a heavy stone riprap, wire and rock mattress, and permeable pile jetties for a distance of about 0.1 miles in Humboldt County, at Dyerville, Calif., in connection with highway improvement (I-Hum-1-C, D).

CONDITIONS: The owner will furnish barbed wire, wire rope, hardware, wire mesh, railroad rail, timber piles, structural timber, and wood preservative. Preference rating AA-3. Contractor to furnish heavy stone riprap and redwood logs. Highway transportation available. Wage rates are: skilled labor, $1.3125 to $1.75 per hour; semi-skilled, 87½c. to $1.25; and common labor, 87½c.

BIDS: Three bids were received August 16, 1944, ranging from the contract low of $41,100 to $69,350.

LIST OF BIDDERS:

1. Schumann & Johnson, Seattle, Wash. (contract) $41,100
2. Fred J. Maurer & Sons, San Francisco, Calif. 67,465
3. Kiss Crane Co., Berkeley, Calif. 69,350

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	Lump Sum	$2,000.00	$2,000.00	$3,500
2. Unclassified excavation	7,000 c. y.	.50	1.00	1
3. Structure excavation	850 c. y.	2.00	2.00	8
4. Imported borrow	1,800 c. y.	.70	1.00	8
5. Heavy stone riprap	4,000 c. y.	6.00	9.00	7
6. Wire and rock mattress	8,700 s. f.	.30	1.00	1
7. Redwood logs	355 l. f.	2.00	3.00	1
8. Drive timber piles	144 ea.	30.00	50.00	70
9. Place timber	10 M bm.	100.00	200.00	100

SANITARY SEWERS
BALTIMORE, MARYLAND

OWNER: City of Baltimore, Md., Dept. of Public Works. George E. Finck, sewerage engineer.

PROJECT: Construction of sanitary sewers in Dundalk, Baltimore City, Md., including furnishing and laying 2,100 feet of 27-in. vitrified pipe sewer encased in concrete; necessary excavation for vitrified pipe and masonry curves in tunnel; excavation below subgrade and for test pits; concrete masonry and brick masonry; manholes; and 6-in. underdrains. All excavation (unclassified) includes sheeting and incidentals. (Contract No. 346.)

CONDITIONS: Contractor to furnish all materials and complete work in 200 calendar working days. Rail and highway transportation facilities available. Wage rates in Baltimore are: skilled labor, $1.4375 to $2.00 per hour; and common labor, 75c.

BIDS: Four bids were received August 11, 1944, ranging from the contract low of $144,320 to $173,506.

LIST OF BIDDERS:

1. Square Construction Co., Baltimore, Md. (contract) $144,320
2. John Matricciani & Sons, Baltimore, Md. 148,890
3. Leo Butler Co., Silver Spring, Md. 169,382
4. Marocco Construction Co., Baltimore, Md. 173,506

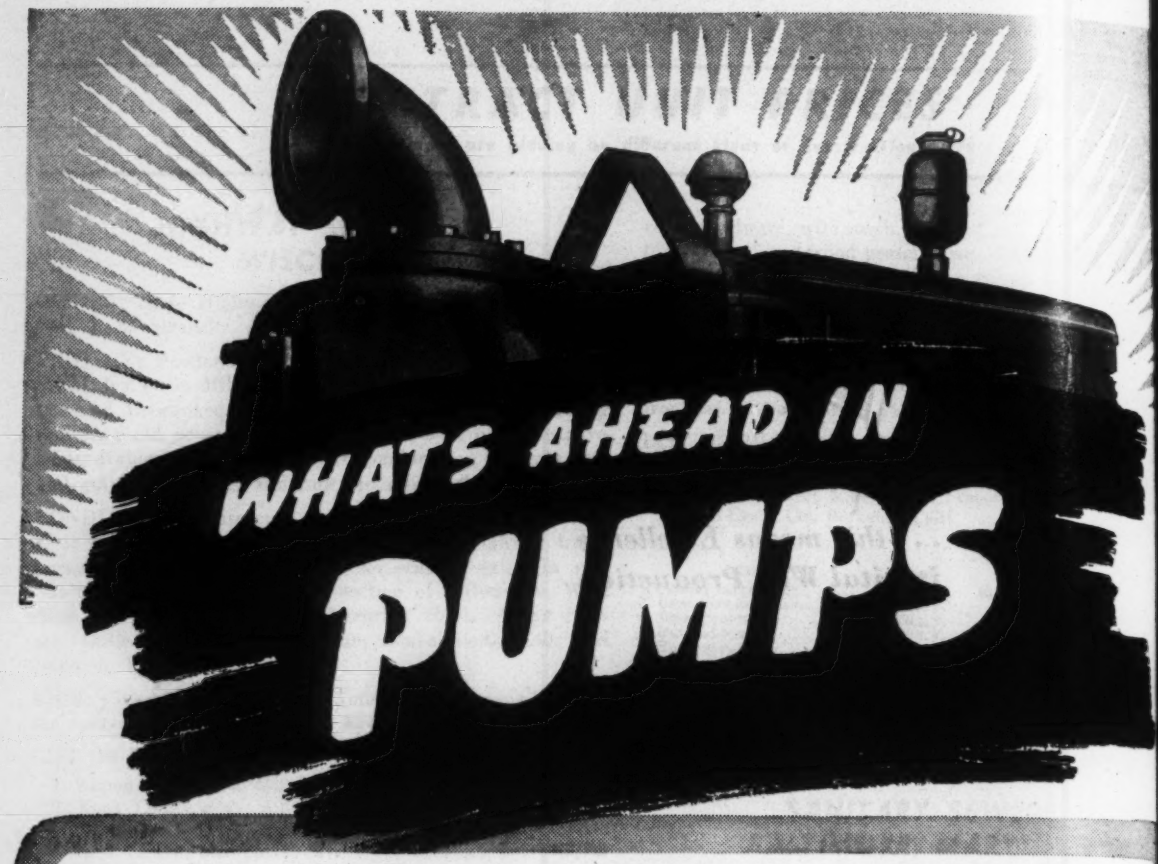
Item	Quan.	Unit Prices (1)	(2)	(3)
1. Uncl. excav. and refill for 27-in. conc. enclosed vitr. pipe sewer, and masonry curves in tunnel	2,098 l. f.	$45.00	$45.00	$55.00
2. Unclassified excav. below subgrade	100 c. y.	5.00	6.00	11.00
3. Gravel refill below subgrade	100 c. y.	5.00	6.00	7.00
4. Unclassified excav. for test pits	50 c. y.	4.00	2.00	7.00
5. Furn. and place cinder topping	100 c. y.	3.00	2.50	2.00
6. Class A concrete masonry	5 c. y	60.00	40.00	40.00
7. Class B concrete masonry	725 c. y.	30.00	28.00	26.00
8. Class C concrete masonry	50 c. y.	30.00	25.00	18.00
9. Ordinary brick masonry	1 c. y.	100.00	60.00	70.00
10. Vitrified brick masonry	2 c. y.	100.00	75.00	60.00
11. Type C manholes (No. 1, 2, 3, 4, 5)	185 l. f.	30.00	70.00	36.00
12. Type C manhole (No. 6)	35 l. f.	40.00	70.00	42.00
13. Uncl. excav., furn. and lay 6-in. underdrain	2,100 l. f.	.50	1.50	2.00
14. Furn. and lay 27-in. vitr. pipe sewer, not including conc. around pipe	2,070 l. f.	8.00	6.00	8.00

. . . this means Excellence
in vital War Production

BUTLER

. . . this means Excellence
in specialized Construction Equipment!

BUTLER BIN COMPANY
WAUKESHA WISCONSIN



HIGHER EFFICIENCY . . . BIGGER CAPACITY . . . MORE FEATURES BETTER PERFORMANCE . . LOWEST COST PER GALLON PUMPED . . . 100% SELF-PRIMING . . . NEW DURABILITY AND STAMINA

Yes, there's a lot to look forward to, and you won't be disappointed. Sensational new CMC Dual Prime CENTRIFUGALS are serving Uncle Sam now — available to all soon! There's a new era in pumps dawning and out in front will be CMC!

GET ADVANCE INFORMATION NOW!

CONSTRUCTION MACHINERY CO.
WATERLOO • IOWA

Watch

For the Latest in

PUMPS . . MIXERS . . CONCRETE GUNS . . BATCHING AND PLACING EQUIPMENT . . HOISTS . . POWER SAWS . CARTS AND BARROWS!

News of the Week

(*Continued from page 90*)

...est opposes further ...eral land ownership

...g the "constant and determined ...of the federal government to cre... ...d perpetuate" government con... ...f the development and use of ... and other natural resources as a ... for grave concern, the Western ...al Council of State Governments ...ly urged its member states to re... ...y further extension of federal ...hip of public lands.

...taining that states should exer... ...maximum of control over their ...l resources, the council went on ... as advocating the formation of ...cts or the adoption of uniform ...tion which would enable them to ... their own facilities and machinery ...rrying out large-scale develop... "by joint and common effort."

...action urging member states to ... a united front in resisting fur... ...equisition by the Federal govern... ...f the west's vast water, power and ...resources was taken at a regional ...g of the Council Sept. 29-30, in Salt Lake City, Utah. Represented at the conferences were eight of the eleven western states.

The council also adopted resolutions recommending: (1) That activities of the U. S. Engineers Corps be enlarged and extended to the study of flood control projects for the prevention and control of soil erosion and that states provide suitable cooperative legislation; (2) that the member states designate one central state agency to appraise the available surplus war property, study the needs of the states, their various subdivisions and cities, and coordinate the surplus with the demands, and (3) that Congress give early consideration to definite Federal aid road legislation that the states may be advised of the extent to which they will be required to provide cooperative funds.

Atty. Gen. Grover Giles of Utah presided over the meetings. Other prominent westerners who participated in the discussions included:

Gov. John Vivian and E. Roy Nelson, director of state planning commission, of Colorado; Atty. Gen. Robert W. Kenny and Alexander Heron, state director of research and development of California; Joe Wood, commissioner of public works of Idaho; Robert Allen, state highway engineer of Nevada; Vincent Jaeger, director of state planning board of New Mexico; Dr. V. P. Morris, chairman of the state commission of readjustment and development of Oregon; Gov. Herbert B. Maw and A. B. Paulson, state superintendent of construction of Utah, and George Hauser, executive secretary of the planning and water conservation board of Wyoming.

• • •

Sewer gas explosion wrecks disposal plant

At Somerset, Ky., on Sept. 30, an explosion of sewer gas seriously damaged a sewage disposal plant erected three years ago at a cost of $70,000. The blast was felt for miles and almost destroyed the plant's pump house, shattering its reinforced foot-thick concrete walls.

Several months are expected to be required for resumption of operations.

FREE!... A Textbook Every Building Man Needs!

THE ONLY AUTHORITATIVE WORK ON THIS IMPORTANT SUBJECT

THOROUGH KNOWLEDGE of Self-Priming Centrifugal Pumps is essential to the modern engineer and builder. This long-needed textbook covers the subject fully.

BRILLIANTLY WRITTEN—Technical but easy-to-understand. Facts are presented in clear, direct order.

PROFUSELY ILLUSTRATED—Replete with graphic drawings and photographs.

COMPLETE BUT CONCISE—A valuable reference work, but condensed for quick, pleasurable reading.

GIVES INSTRUCTIONS—Tells how to install and operate self-priming centrifugals.

PRAISED BY AUTHORITIES — Reviewers agree that it fills a long-felt want. You are cordially invited to send for a copy.

MARLOW PUMPS *Manufacturers of Pumping Equipment* RIDGEWOOD, NEW JERSEY

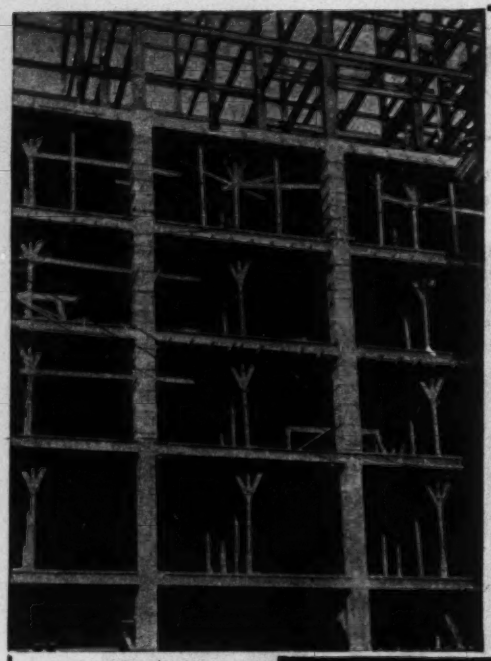
MARLOW PUMPS, RIDGEWOOD, NEW JERSEY

Please send me a copy of the new textbook, "Self-Priming Centrifugal Pumps."

Name.....

Street.....

City..... *State*..... ENR



ON A JOB LIKE THIS

or wherever standardization is desirable and repetitive operations possible

LUMBER IS NO PROBLEM

Engineers, designing structures of readily available concrete and reinforcing steel, simply prepare layouts which conform to our available abundant stock of easily erected, removable

HAUSMAN STEEL FORMS

leased outright or erected complete, including centering.

Hausman shores, stringers and forms permit concrete work at a profit. Predetermined schedules are maintained, cost uncertainty eliminated, rapid progress and safe operation insured.

Send rough outline for suggestions or comparative cost information. No obligation. Hausman's complete working drawings for coordination with contractor's forms, show all openings for mechanical trades. Expensive field changes are eliminated.

HAUSMAN ROUND COLUMN MOLDS:
Adjustable to all heights and diameters in 2-inch jumps. Easily and quickly stripped for re-use 24 hours after pouring. Standard conical heads in 6-inch multiples.

HAUSMAN RIBBED SLAB FORMS:
Long spans. Few laps. Structural channel soffits. No leakage. Straight, uniform joints. Ample working space. No reshoring. Shores directly superimposed.

HAUSMAN SOLID SLAB FORMS:
For exposed solid slab ceilings. Steel beam supports eliminate need for intermediate shores. Large sheets of Presdwood minimize finishing costs.

THE HAUSMAN STEEL CO., TOLEDO 1, OHIO

Gravel output reflec reduction in building

The Bureau of Mines announced percent decrease in 1943 in the pr tion of sand and gravel over the output. Since over 90 percent of material is used for construction greatest decrease was at plants in where the reduction in constructio ume has been large due to completi projects.

Total production amounted to 064,000 short tons valued at $152 000 in 1943, in comparison with 346,000 tons with a value of $188 000 in 1942. Approximately 75 pe of the output was supplied by com cial plants and 25 percent by contra and highway maintenance crews ployed by government agencies.

Output of government-and-contr operations, all of which is used in b ing and paving, decreased 19 per from 71,399,000 tons in 1942 to 57 000 tons in 1943, while average co creased from 41 to 43 cents a ton. proximately 23 percent was prep material averaging 75 cents a ton; prepared brought 34 cents. Const tion and maintenance crews of st counties, municipalities, and other ernment agencies produced 25,34 tons averaging 31 cents a ton; outpu contractors was 32,247,000 tons a cents a ton. Of the total governm and-contractor tonnage, states furni 32 percent, counties 25, municipaliti and other government agencies 41 cent.

• • •

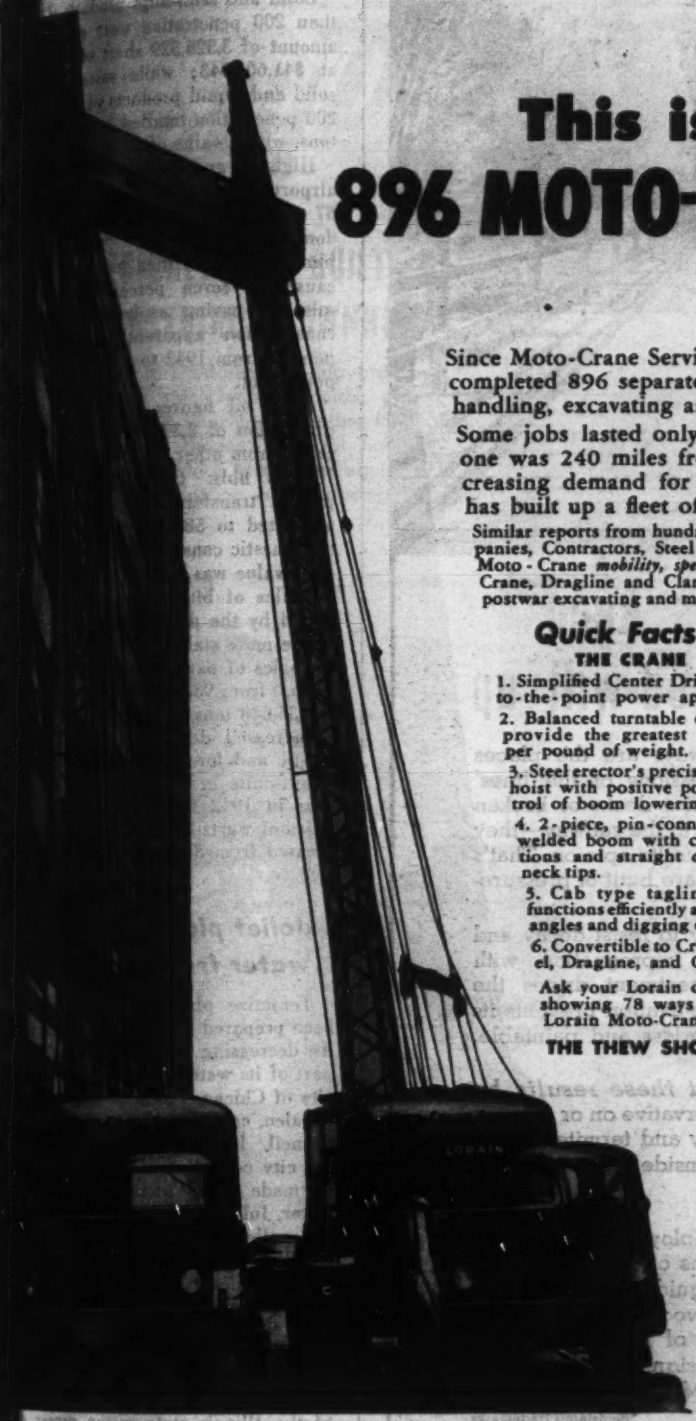
Asphalt sales stable; road oil sales decline

The Bureau of Mines reports while refinery sales of petroleum asp to domestic consumers in the U States increased one percent in ton in 1943 over 1942, such sales of r oil decreased 71 percent, with the ter sales confined mostly to the R Mountain district, and to Califo "Much that was reported as road could have been better describe liquid asphalt," says the bureau's port. Monetary value of the asp rose 11 percent, and that of road decreased 60 percent.

The 1943 figures, in short tons, s a production of 6,756,700, rec from other sources 717,400; and c sumption by companies, transi losses, and exports 424,000, with s to domestic consumers amounting 6,897,800.

Of the asphalt sold to domestic c sumers, four percent was manufactu from foreign petroleum, chiefly fr Venezuela and Mexico.

This is *One* of 896 MOTO-CRANE JOBS



Since Moto-Crane Service, Inc., Detroit, started in 1940, they've completed 896 separate jobs covering every phase of material handling, excavating and rigging.

Some jobs lasted only a few hours, others up to 17 months; one was 240 miles from Detroit. To handle the steadily increasing demand for Moto-Crane service, this organization has built up a fleet of 6 Lorain Moto-Cranes.

Similar reports from hundreds of other Moto-Crane owners—Service Companies, Contractors, Steel Erectors, Industrials — are further proof that Moto-Crane *mobility, speed-in-transit and ready convertibility to* Shovel, Crane, Dragline and Clamshell provide the profitable answer to many postwar excavating and material handling problems.

Quick Facts About the Moto-Crane

THE CRANE

1. Simplified Center Drive direct-to-the-point power application.
2. Balanced turntable design, to provide the greatest capacities per pound of weight.
3. Steel erector's precision boom hoist with positive power control of boom lowering.
4. 2-piece, pin-connected all-welded boom with center sections and straight or gooseneck tips.
5. Cab type tagline which functions efficiently at all boom angles and digging depths.
6. Convertible to Crane, Shovel, Dragline, and Clamshell.

THE CARRIER

1. 3-axle mounting on 10 rubber tires. Both tandem rear axles drive.
2. High speed transmission range for road travel — low range for off-the-road travel.
3. Close-coupled, 175" wheelbase for better maneuvering.
4. Steering gear designed for soft ground travel.
5. Special chassis frame. No Moto-Crane frame has ever failed.
6. 10 speeds forward—and 2 reverse. Unit will climb a 30% grade.

Ask your Lorain distributor for the big 32-page catalog showing 78 ways to speed work — save money with a Lorain Moto-Crane.

THE THEW SHOVEL COMPANY · Lorain, Ohio

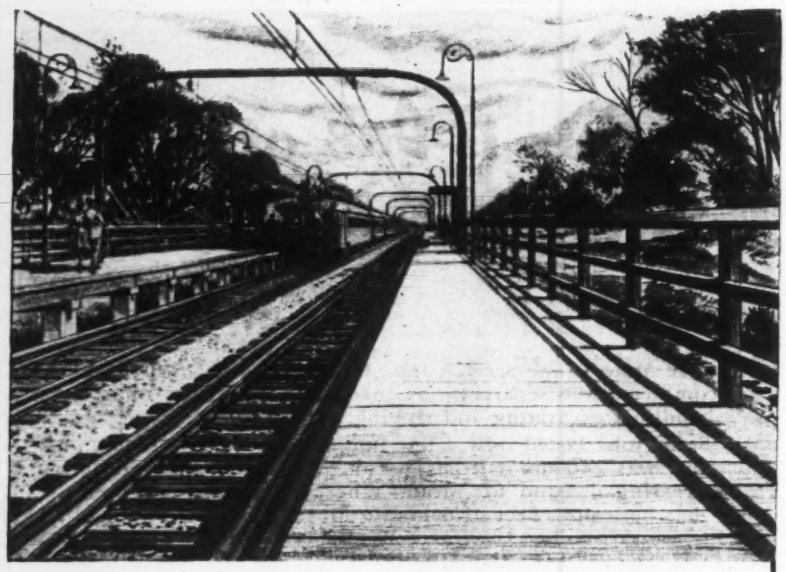
Moto-Cranes, with 90' booms lifting a 6½-ton bottle washer to the 6th floor level.

Reg. Trade Mark

thew-Lorain

It's not a MOTO-CRANE unless it's built by THEW-LORAIN

CRANES · SHOVELS · DRAGLINES · MOTO-CRANES



Treated wood helps keep overhead down, good-will up

Station platforms on interurban railways are the places where patrons form their first impressions of the lines' service and efficiency. Decayed platform decks or broken steps are not only a source of expense to the railway—they can also mar an otherwise favorable public opinion. That's why so many of these "front porches" are built of pressure-treated Wolmanized Lumber*.

Wolmanized Lumber owes its ability to resist decay and termite attack to vacuum-pressure impregnation with Wolman Salts* preservative. This treatment drives the preservation deep into the wood; fibre-fixation prevents its leaching out. The wood is clean, odorless and paintable.

You can't get these results by painting a preservative on or dipping the wood. Decay and termites find it too easy to get inside a film so loosely applied.

Wolmanized Lumber has been employed all over the world by our armed forces, as a means of effectively combatting decay and termite attack. Be guided by the choice of engineers who have selected this wood after observing the splendid performance of millions of feet of Wolmanized Lumber in the toughest kind of assignments. American Lumber & Treating Company, 1649 McCormick Building, Chicago 4, Illinois.

*Registered trademarks

WOOD THAT'S Alloyed FOR SAFETY AND ENDURANCE

AMERICAN LUMBER & TREATING COMPANY

Solid and semi-solid products of less than 200 penetration were sold in an amount of 3,526,329 short tons, valued at $41,608,343; while sales of semi-solid and liquid products of more than 200 penetration totalled 3,371,472 short tons, with a value of $37,254,487.

Highway and street construction and airport runway surfacing accounted for 67 percent of the total asphalt sold to domestic consumers. "Governmental purchases rather than private contracts caused a seven percent increase in sales of paving asphalt, as highway construction apparently declined 40 percent from 1942 to 1943," the report points out.

Road oil figures show for 1943 a production of 2,295,000 bbls., with receipts from other sources amounting to 187,000 bbls. Consumption by companies, transfers, losses, and exports amounted to 583,000 bbls.; and sales to domestic consumers, 2,054,000. Total sales value was $3,846,000.

"Sales of bituminous rock were affected by the decline in road building of the more stable types which reduced the sales of paving asphalt from petroleum," from 933,295 short tons in 1942 to 835,648 tons in 1943.

Increased demand in both the domestic and foreign market raised sales of gilsonite in Utah from 40,041 short tons in 1942 to 50,446 tons in 1943. Sales of wurtzilite in the same state increased from 37 to 41 tons.

. . .

Joliet plans to buy water from Chicago

Tentative plans and estimates have been prepared by Joliet, Ill. to augment its decreasing well supply by buying part of its water requirements from the city of Chicago, according to Joseph F. Whalen, commissioner of the Joliet city council. If the plans are approved by the city council, and arrangements can be made with Chicago to furnish the water, Joliet plans to buy about 15,000,000 gallons daily.

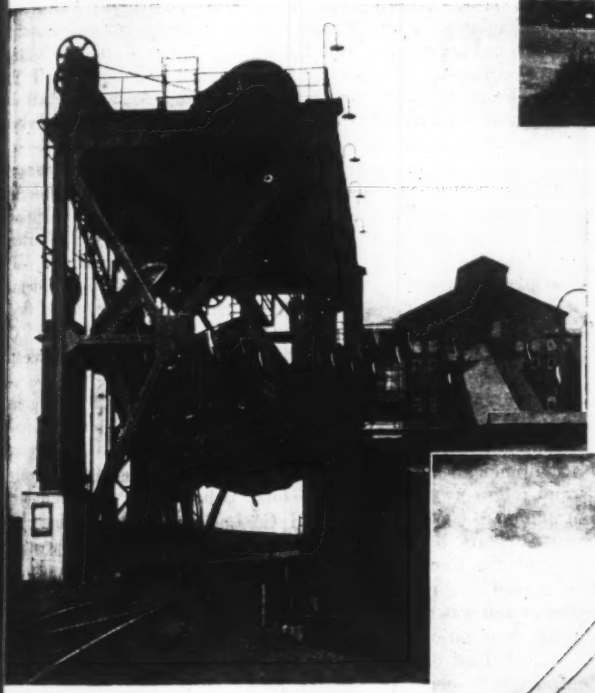
Joliet must consider buying water from Chicago, said Commissioner Whalen, because the subterranean water table supplying Joliet wells is dropping. In one of the city's best wells, the level has been lowered 95 ft. during the last six years. J. J. Woltman, acting chief of the Illinois state water survey division, has recommended that Joliet buy Chicago water as a more economical step than attempting to find new wells.

The proposed plans call for construction of a 32-mi. long, 42-in. water main to connect with Chicago's water tunnel at 73rd St. and Western Av. A pumping station also would be built at this location. The estimated cost of the work is $4,222,000.

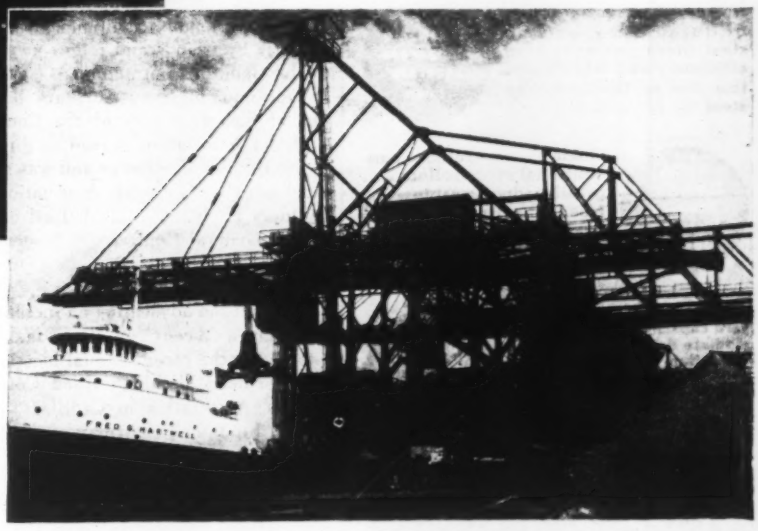
Heavy Duty Equipment

DESIGNED AND BUILT BY INDUSTRIAL BROWNHOIST

From Maine to California, in shipyards, dry docks, ports, steel mills, chemical plants, railroads and in nearly every other kind of industry where efficient material handling is required, Industrial Brownhoist equipment is speeding production and reducing man hours.



Above: An Industrial Brownhoist 40-ton Diesel locomotive crane at a Great Lakes yard easily swings an army boat to flat car after trial run. The patented Monitor-type cab provides 360° visibility, increases operator efficiency. Left: Electrically operated Industrial Brownhoist dumper handling 100-ton cars of coal, dumps coal into proper section.

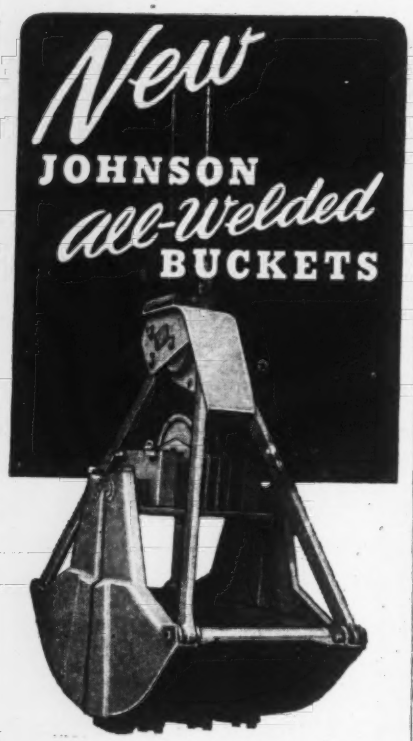


Right: A 10-15 ton capacity Industrial Brownhoist fast plant for unloading iron ore from lake boats. Moveable lorry rides on runway, weighs ore and delivers it to railroad cars under span.

Write for further facts about Industrial Brownhoist equipment to solve your material handling problem.

INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

INDUSTRIAL BROWNHOIST CORP. • BAY CITY, MICH. • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Pittsburgh, Chicago • Agencies: Detroit, Birmingham, Houston, Denver, Los Angeles, San Francisco, Seattle, Vancouver, B.C., Winnipeg, Manitoba, Canadian Brownhoist, Ltd., Montreal, Quebec.



New and exclusive Johnson features give this new streamlined bucket efficiency-promoting and life-prolonging advantages in all centers of action.

Needle Bearings Sealed Against Dirt

All-Welded Construction Reduces Digging Resistance

Its all-welded construction eliminates power-wasting bolts and rivets . . . provides greater stability through proper weight distribution.

A renewable lip edge bar, of durable manganese steel, gives greater digging efficiency and many times the life of the ordinary steel lip construction.

Renewable Manganese Steel Lip Edge

Large Diameter Sheaves Increase Rope Life

Guide sheaves replace conventional cross-rollers . . . greatly reducing cable wear. Needle bearings (protected against dirt by special synthetic rubber seals) are used on all closing sheaves.

General Purpose Type (½ to 2 yard capacity) in stock for immediate delivery to U. S. and Canadian contractors with required Government authorization. The line also includes Rehandling Buckets ½ to 2½ yards, Heavy Digging ½ to 1½ yards.

Get Data on Johnson Bins —Batchers— Ready-Mix Plants

The C. S. Johnson Company
Champaign, Illinois

Elections and Activities

G. E. Krieger of Everett, Wash., has been elected president of the Washington State Good Roads Association. He succeeds Howard E. Phelps of Pullman. Frank Putnam, Tonasket, will fill Mr. Krieger's previous position as chairman of the executive committee. Elected to serve as vice presidents in their congressional districts were: Harry Cotton, Port Townsend; Harold Belknap, Seattle; Austin B. McCoy, Vancouver; George O. Beardsley, Prosser; J. R. Everett, Okanogan, and Lyle Abrahamson, Tacoma.

Fred Palmer of Indianapolis, Ind., and C. I. Babcock of Miami, Fla., each president of his local builders' association, have been chosen directors of the National Association of Home Builders. Eleven new affiliate associations had been accepted by the national organization since May. They are at Boston, and Springfield, Mass.; Jacksonville and Miami, Fla.; Memphis and Nashville, Tenn.; Dallas, Tex.; Des Moines, Ia.; Sausalito, Calif.; and Ft. Wayne and Indianapolis, Ind.

Edgar R. Taylor, Jr., of the engineering department of Jacksonville, Fla., was elected president recently of the Engineering Professions Club. He had been secretary. D. O. Foshee was re-elected vice president, R. N. Garth was named treasurer, Frank Capps, secretary and W. J. Fowler, program director.

John A. Dahl, Milwaukee, Wis., was the guest of honor at a dinner given him recently by friends and fellow members of the General Contractors Association. A contractor for about 50 years, he was one of the organizers of the Concrete Builders Association, served as director of the Builders Exchange and was president of the National Association of Builders Exchanges. He helped organize the General Contractors Association of Milwaukee.

A resolution advocating an increase in the state's 3-cent gasoline tax was adopted at the recent annual meeting of the Northern Michigan Road Commissioners' Association in Cadillac.

Carl Lindquist, chairman of the Wexford County Road Commission, was elected president of the association; S. A. Rogers, Charlevoix County Road Commission, vice president; Ben D. Jeffs, Missaukee County Road Commission, re-elected secretary, and N. E. Wicks, Lake County Road Commission, re-elected treasurer.

Auguste Boyer of Montreal has been named president of the Quebec Running Streams Commission.

R. B. Rice of Raleigh, secretary-treasurer of the North Carolina Society of Engineers, reports that the society now has a membership of 750, an increase of 450 over 1940, making the group one of the largest professional organizations in the South. Roy L. Williamson of Raleigh, chairman of the nominating committee, announced that Louis Payne, of Raleigh, now serving as vice president, is the committee's choice for election as president.

The Texas State Board of Registration for Professional Engineers has elected the following officers: E. W. Pittman, Beaumont, chairman; Datus E. Proper, San Antonio, vice-chairman; and Carl L. Svenson, Lubbock, secretary. Other board members are J. B. Thomas, Ft. Worth; A. S. Mitchell of Corsicana; and J. S. Hudnall, Tyler.

Col. Charles B. Borland, city manager of Norfolk, has been elected president of the League of Virginia Municipalities. Other new officers are: W. B. Carter, Roanoke, first vice-president; T. W. Preston, Bristol, second vice-president; W. C. Fitzpatrick, Farmville, third vice-president; and Capt. William C. Herbert, Richmond, 4th vice-president.

C. Stuart Duggins, city building inspector, Richmond, was elected president of the Building Officials Conference of Virginia. He succeeds J. T. Neely, of Norfolk. Other officers chosen are: Donald C. Locke, zoning engineer of Arlington County, first vice-president and A. R. Lash, Alexandria, second vice-president. Chosen to serve as members of the executive committee are the officers and E. R. Perkins, Roanoke, L. B. Dutrow, Front Royal, and C. H. Daughtry, Franklin.

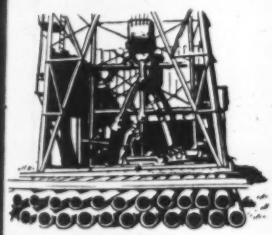
Edgar Taylor, former secretary, is the new president of the Engineering and Professional Club of Jacksonville, Fla. Other officers are D. O. Foshee, vice-president; R. M. Garth, treasurer; Frank Capps, secretary and Bill Fowler, program director.

Employees of the Wilmington Branch of the Dravo Corp., Wilmington, Del., have recently formed an Engineer's Club for discussion of engineering and technological matters. Newly elected officers are: C. P. Streithoff, president; G. W. Alexander, vice president; P. H. Kline, secretary; and H. K. Hicks, treasurer.

For the new dump trucks, shovels, compressors, locomotives, or the various other heavy-duty construction and material handling equipment you are planning to buy, specify Cummins Diesel power. Practically all of the leading manufacturers offer this diesel as optional equipment.

In the Northwest Woods, Cummins Diesels do the complete job—from show to siding. They power yarders, loaders and tugs . . . trucks that handle up to 240,000 pounds (three carloads). In this service, Cummins Diesels are the symbol for "cheap logs."

In the commercial fishing fleets of the Pacific, Atlantic and Gulf coasts, and in all types of work boats and pleasure craft, Cummins Marine Diesels—propulsion engines and generating sets alike—have become a byword for dependable, low-cost performance.



In the vast Mid-Continent area, the world's greatest oil producing territory, Cummins Dependable Diesels power more rotary and cable tool drilling rigs and oil well service units than any other make of diesel engine.

Step by Step

Tremendous weight and size greatly limited the uses of early-day diesels. Twenty-six years ago, the builders of Cummins Diesels decided to do something about that—and did! Step by step, and with *each step first tested and proved on the job*, they simplified design . . . improved construction processes . . . turned to lighter, stronger materials . . . steadily boosted the rpm. That, briefly, is the story of the modern Cummins Diesel . . . the *original high speed diesel* that, since 1932, has won its spurs on the toughest, heavy-duty jobs . . . in virtually all types of heavy-duty equipment, automotive, industrial, marine. For tomorrow, continued refinements in diesel manufacture promise a Cummins Dependable Diesel that will do your job still cheaper, still faster, still longer. So plan now to standardize on Cummins Diesel power for the equipment you will build or operate after the war. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.

END 50° SLOW-UP* IN FALL CONCRETE

by using ↓

SOLVAY CALCIUM CHLORIDE

*Temperatures of 50°F. or lower seriously slow the development of strength of concrete.

The addition of Solvay Calcium Chloride to the mix during this cool fall weather will provide:

1. **Quicker finishing.**
2. **Quicker use of the finished concrete.**
3. **Doubles output of forms.**
4. **Makes stronger, denser, more waterproof concrete.**
5. **Does not change normal chemical action of portland cements.**

Write for free booklet giving complete details on the use of Solvay Calcium Chloride with portland cements. Address Dept. 37-10.

SOLVAY SALES CORPORATION

40 Rector Street New York 6, N. Y.

MEN AND JOBS

The appointment of **Willard A. Anderson** as mechanical superintendent of the Government Printing Office at Washington, D. C., to succeed the late Alfred E. Hanson was recently announced. In 1928 Mr. Anderson was engaged as assistant structural engineer in the office of the supervising architect of the Treasury Department. He transferred to the Government Printing Office as assistant structural engineer in 1930 and has been on the staff continually since. Prior to his federal service he was associated with the Illinois State Highway Department.

The mechanical superintendent of the Government Printing Office is responsible for the operation of the maintenance division and its director is supervisor of all engineering, construction and maintenance work.

William H. Mueser, of Moran, Proctor, Freeman and Mueser, New York consulting engineers, recently returned from Caracas, Venezuela, where he has been engaged in connection with the construction of the "Ciudad Universitaria" in Caracas.

J. T. Knight, former executive officer and district engineer of the Wilmington, N. C., engineering district, has been promoted to colonel from lieutenant colonel in Brazil where he is engineer officer in charge of construction and maintenance of all airports in the South Atlantic Command.

Capt. J. E. Schumaker and **Capt. Winfield S. Luther** are commanding officers of Engineer Utilities Detachments which have arrived at Camp Butner, N. C., from Camp Sutton, N. C., for field training in construction and maintenance work.

Elliott J. Dent, Colonel, Corps of Engineers, retired, and consulting engineer of Washington, D. C., recently returned from Barranquilla, Colombia. Colonel Dent has been working on the Magdalena River project at Barranquilla.

Giles M. Robertson has resigned as safety engineer and assistant personnel director of the Virginia Department of Highways to become a member of the insurance firm of Claiborne, Goodridge & Goddin, Inc., Richmond. Mr. Robertson had been connected with the highway department for 13 years.

Maj. R. M. Dixon, formerly associated with the Dallas, Tex., water and sewer departments, has been promoted from captain with the Eighth Service Command at Dallas. He is in charge of the Command's sewage and water plants.

H. W. L. Doane, Manager of Standard Paving (Maritime), Ltd., has been named manager of the newly formed Halifax, N. S., Public Utilities Commission, which will take over the direction of the city's water system.

Promotion to major of **Capt. Clarence W. Klassen,** of Springfield, Ill. has been announced by Eighth Service Command headquarters, Dallas, Tex. Maj. Klassen is chief of the sanitary section in the office of the service command surgeon. He is on military leave from positions as chief sanitary engineer of the Illinois state department of health and as associate professor of bacteriology and public health at the University of Illinois college of medicine.

David B. Lee, of Pensacola, Fla., who served as an Army sanitary engineer in New Guinea, has been promoted to major. He has returned and now is stationed in Washington, D C., as a malaria consultant to the office of the Coordinator of Inter-American affairs.

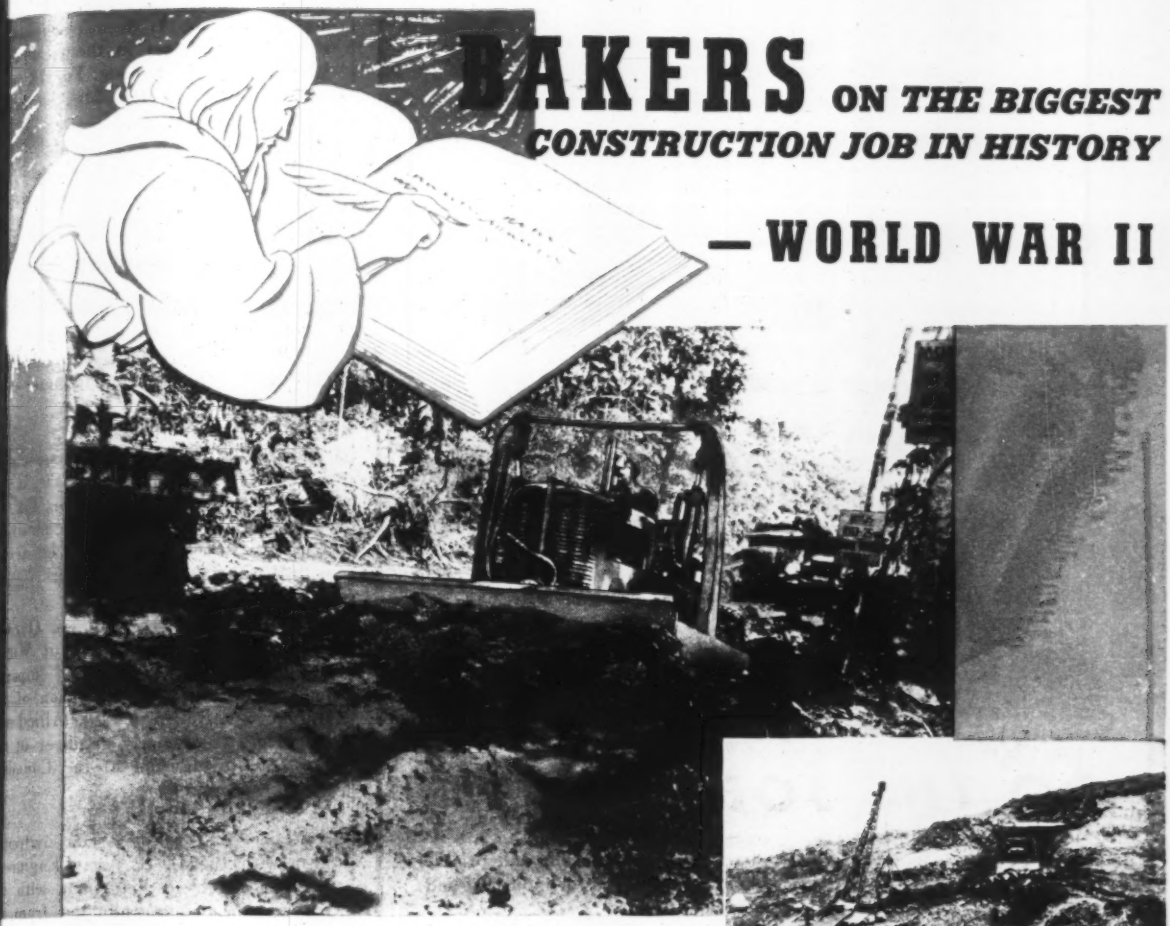
Frank E. Bell, former construction engineer and acting project manager for the TVA Watts Bar project, has joined the organization of the Maxon Construction Co., Dayton, Ohio. A graduate of Alabama Polytechnic Institute in 1921, Mr. Bell has had a wide experience in hydroelectric and electrical engineering and construction. At one time he was connected with Stone & Webster Engineering Corp., and for the past year has been on loan to the steam turbine section of the War Production Board.

R. I. Groover, Wilmington, N. C., has resigned as associate division director of the Office of Defense Transportation, Washington, D. C. He will return to Wilmington to serve with Atlantic Coast Line Railroad as assistant chief engineer.

Leonard A. Bergman has been appointed director of the division of build-

BAKERS ON THE BIGGEST CONSTRUCTION JOB IN HISTORY

—WORLD WAR II



Tops: Baker building road in New Caledonia. Centers: Making final "cleanup" in Fiji Islands. Bottom: Dozing trees for air base, Australia. Bakers are on every front.

So you think Boulder Dam and the Panama Canal were big jobs? They were pikers compared to the construction job of them all—World War II. More earth is being moved, more trees dozed, more roads, bridges and buildings built and more buildings razed than on any other job at any time.

It's taking an endless amount of construction equipment of all kinds, including Baker Bulldozers and Gradebuilders by the hundreds.

This *Biggest Construction Job* calls for speed—that's where Bakers come in. Powerful hydraulic down-pressure on the blade bites deep into Italian lava, Algerian sand or South Pacific coral —gets full loads faster. Too, Bakers are as simple as they look—fewer parts—easier to maintain. No wonder the boys in the Seabees and the U. S. Engineers swear *by* them—not *at* them.

After monthly war quotas have been met, a few units are left for high priority requirements. If yours is a war job, you may be eligible. See your Baker, Allis-Chalmers dealer.

THE BAKER MFG. CO.

567 Stanford Avenue **Springfield, Illinois**

BULLDOZERS SNOW PLOWS **BAKER** CONSTRUCTION EQUIPMENT

When YOU'RE BUILDING A NATION... DO THE JOB RIGHT!

Engineers, architects, contractors and builders are face to face with a never-dreamed-of opportunity.

Building the world's greatest nation is going to be resumed. There's so much to be done, we can't afford the labor and materials to do any job over . . . it has to be right the first time. And whether the job's done once and for all the first time depends in a large measure on your specifications—particularly for materials.

There is one material you *can* depend upon to stay put in sewage and drainage systems . . . It's *Clay Pipe*, manufactured from nature's most enduring material!

SPECIFY CLAY PIPE!

For Permanent Pipe Installations With Lower Final Cost . . .

Clay Pipe resists acids, alkalies, industrial wastes, gases, the abrasive action of silt and gravel without decomposing, crumbling or corroding . . . and eliminates the need for frequent service or premature replacement. *Clay Pipe* can be depended upon to outlast bond issues . . . to pay its own way! Specify *Clay Pipe* for highway, street, airport, railway, farm and home drainage . . . for public and private sanitary sewers . . . for industrial and trade waste lines.

NATIONAL CLAY PIPE MANUFACTURERS, INC.

111 W. Washington St.
Chicago 2, Illinois

GUARANTEED FOR 50 YEARS!

National Clay Pipe Manufacturers, Inc. members back their Clay Pipe with a 50-year guarantee. No other pipe matches this guarantee of service!

YOUR LOCAL AUTHORIZED DEALER

Has the material you need. He's listed in the Yellow Pages of your Telephone Directory, under "Pipe" and this trademark:

C-1044-5

CLAY PIPE

ings, Buffalo, N. Y. He has resigned as a sanitary engineer in the New York State Health Department. For 12 years he was director of public works, Jamestown, N. Y.

Air Vice-Marshal R. R. Collard, director of works and building construction and engineering, Royal Canadian Air Force, Ottawa, Ont., is retiring to resume private practice as a contractor.

Ralph B. Dibble, engineer with the Michigan State Highway Department, has been appointed assistant to Harry C. Coons, deputy commissioner-chief engineer.

E. J. McGinnis, formerly associated with his father, T. D. McGinnis, in the T. D. McGinnis Construction Co., Houston, Tex. has been promoted to captain in England, where he serves with the U. S. Army Engineers.

Maj. V. R. Bowers, of the Queen's Own Cameron Highlanders of Winnipeg, Man., has been named superintendent of the Naples division of the Italian State Railways under Allied control. He was formerly engineer of the Port Arthur division of the Canadian National Railways.

Robert E. Jordan, former civil engineer with the U. S. Army Engineers, became a second lieutenant with the corps upon being graduated from the officers' candidate school at Fort Belvoir, Va.

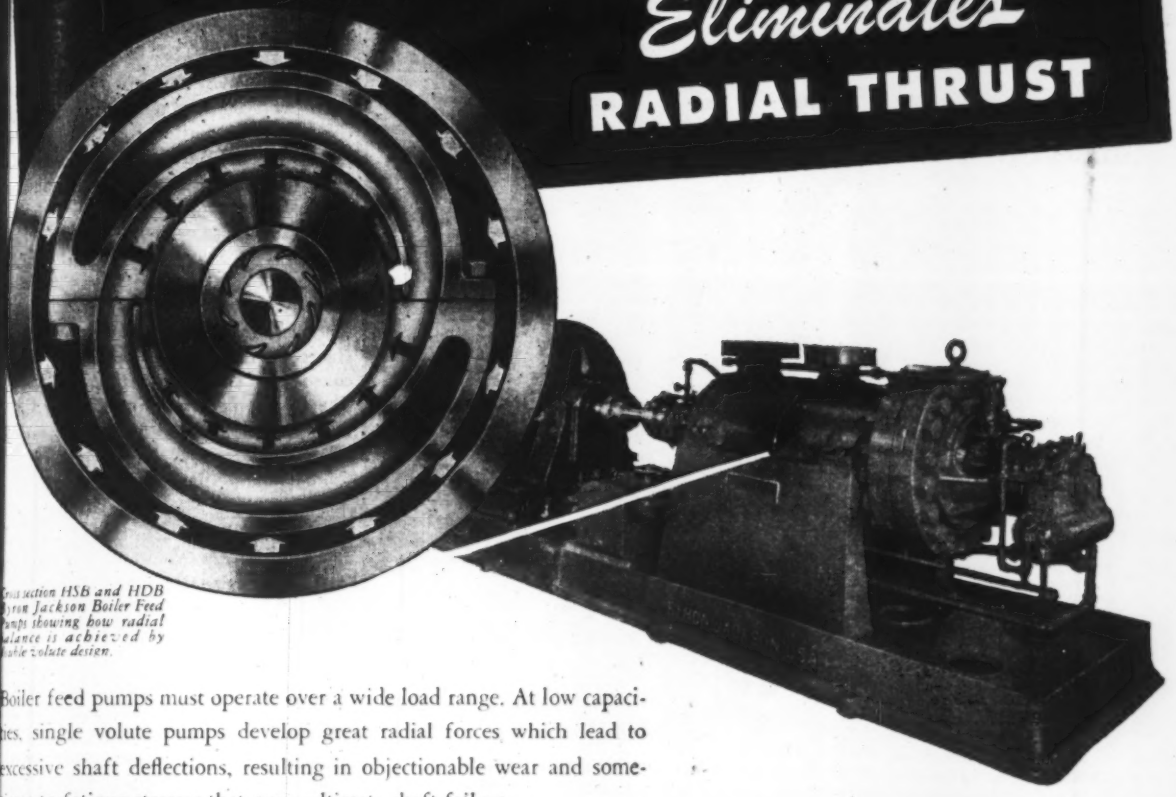
Col. D. Kingdom Black of Montreal, Que., deputy chief engineer of works and buildings, has been promoted to acting brigadier of the 1st Canadian Army.

Maj. John S. Detlie has been appointed executive officer of the Seattle district, U. S. Army Engineers, it was announced recently by Col. Conrad H. Hardy, district engineer. Major Detlie was called to active duty in June, 1941, as officer in charge of camouflage in Seattle. He holds a degree in engineering from the University of Alabama.

Phillip Carlton Perry, of Port Arthur, Ont., has been named district engineer for Saskatchewan Province for the Canadian National Railways with headquarters at Saskatoon, Sask. Mr. Perry started as rodman with the Grand Trunk Pacific R.R. in 1907.

H. W. L. Doane has taken over the duties of engineer and manager of the newly formed Public Utilities Commission, Halifax, N. S. He is setting up

In Byron Jackson High Pressure Boiler Feed Pumps
DOUBLE VOLUTE DESIGN
Eliminates
RADIAL THRUST



Cross section HSB and HDB Byron Jackson Boiler Feed Pumps showing how radial balance is achieved by double volute design.

Boiler feed pumps must operate over a wide load range. At low capacities, single volute pumps develop great radial forces which lead to excessive shaft deflections, resulting in objectionable wear and sometimes to fatigue stresses that cause ultimate shaft failure.

To overcome such action, in Byron Jackson Double Case Pumps these radial pressure loads are balanced out completely by the use of Double Volute Inner Cases. Each volute is divided into two identical fluid channels in the plane of the impeller, with outlets 180° apart, resulting in opposed forces of equal magnitude and radial balance without pressure bending moment on the shaft at any capacity.

Capacity range of the Type HSB pump is from 100,000 to 400,000 pounds per hour. Type HDB is from 350,000 to 1,000,000 pounds per hour. Pressure range of both types is from 1,000 to 2,000 psi. in standard designs.

The benefits of our accumulated experience in designing pumps for high pressures and temperatures is available to you upon request.

(ABOVE LEFT)
Single volute, illustrating the unequal distribution of forces between intake and discharge points.

(ABOVE RIGHT)
Double volute, showing the equality of opposing forces at any given point of the entire circumference.

ARMY (E) NAVY

BYRON JACKSON CO.

Houston • LOS ANGELES • New York

select the right jack for . . .

your reconversion changes

USEFUL TABLE OF BUDA JACKS

TYPE OF JACK	LOAD TO BE LIFTED: Light 1-15 tons	LOAD TO BE LIFTED: Med. (15-)	AMT. OF RISE: Space of Operation: Under 15"	AMT. OF RISE: Space of Operation: Uncon-fined	*Can Be Operated at Angles	CONTROL OF LOWERING: Drops Load	CONTROL OF LOWERING: Fast Lowering	CONTROL OF LOWERING: Slow Lowering	CONTROL OF LOWERING: Variable Control
Automatic Lowering									
Ratchet Trip Type	•				•	•			
Ball Bearing Journal	•				•			•	
Std. Speed Safety	•							•	
Self-Lowering	•								•
Screw	•							•	
Telescopic Screw	•							•	
Ratchet Screw	•							•	
Single Speed Hydraulic		•		•			•	•	•
Two Speed Hydraulic		•		•			•	•	•
Special Purpose Jacks: Pole Pulling							•		
Special Purpose Jacks: Klinch-Klaw	•								
Special Purpose Jacks: Cable Reel (Automatic Lowering)	•								
Special Purpose Jacks: Cable Reel (Screw)	•							•	
Special Purpose Jacks: Push-Pull	•							•	
Special Purpose Jacks: Shoring	•								
Special Purpose Jacks: Trench Braces	•								

Automatic Lowering Jack

All lifting jobs made necessary by reconversion—maintenance—construction or production can be done easier, quicker and safer by using sturdy, reliable BUDA Jacks. Mechanical and Hydraulic models range in sizes up to 200,000 lbs. lift. Select the correct jack from the BUDA Jack pocket manual: sent upon request.

BUDA

15413 Commercial Ave.
HARVEY (Chicago Suburb) ILLINOIS

machinery for the operation of the board.

George B. Wood, engineer in the Federal Works Agency regional office in Richmond, Va., who recently resigned to go overseas, expects to be with the Balkan mission of the United Nations Relief and Rehabilitation Administration and have headquarters in Cairo, Egypt.

Col. B. B. S. Campbell, civil engineer, who constructed the $2,000,000 Confederation Building in Ottawa and the Daily Star Building in Toronto, has been named assistant deputy minister of the Department of National Defence, Ottawa, Ont.

James C. Brown and **Frank Ragaini** have incorporated as Clarence Blair Associates, Inc., 100 Crown St., New Haven, Conn. The firm will operate as consulting and contracting engineers. The former firm was operated by Clarence Blair, and in the past provided engineering service for a number of Connecticut water projects.

Newly named administrative officer of the engineering division of Jeffersonville Quartermaster Depot, Louisville, Ky., is **Capt. Joseph Sloss Jr.,** who succeeds **Capt. Jules Ebin,** now public relations officer there.

A. I. Savin, head of the Savin Construction Co., East Hartford, Conn., has joined with Isadore Savin and Burl A. Wilder to form the Whaling City Dredge & Dock Co., New London, Conn. The company will handle dredging and dock contracts.

Thomas R. Camp, consulting engineer of Boston, has announced that he has acquired the consulting practice of the late Samuel M. Ellsworth (*ENR* Aug.24p.209) and has moved to the offices formerly occupied by Mr. Ellsworth at 6 Beacon St., Boston, Mass.

Maj. Jacques Dery has recently been promoted from captain. He was formerly with the department of Public Works as a junior engineer at Montreal. Major Dery is with a survey regiment of the Royal Canadian Artillery in England.

Harold T. Nelson has been appointed construction engineer to head the Roza division of the Yakima Wash., project under construction by the Bureau of Reclamation. He had served as acting construction engineer since the retirement of C. E. Crownover last year. He had been with the project at Yakima since 1937, previously serving with the bureau at Denver.

New Horizons *in* WELDING

A NEW 16MM. SOUND FILM

Here It Is! The Dramatic Story of Production Welding—Brought to You Via Motion Pictures

"New Horizons in Welding" is the first complete story of production welding ever to reach the screen . . . 30 fast-moving minutes of *sound* screen entertainment.

Here is the drama of the electric arc — the gleam that has grown from a glimmer — *grown 500 times in 10 years!* Here, too, is an education in the methods used to cut costs and speed production where welding has hit the peak of its development — in the fabrication of all-welded products.

An "Inside" Story — But Available to All

"New Horizons in Welding" is *really* an inside story . . . filmed in the plant of one of the world's largest *makers* as well as *users* of all-welded equipment. There you see the step-by-step procedure for welding on a mass production basis. *Every step,* from the birth of a project in the blueprint department to the host of labor-saving devices which speed it to completion — you'll see them all in "New Horizons in Welding."

P&H offers this absorbing, educational feature *without cost* to all interested groups — manufacturers, industrial schools, shipyards, government agencies, etc. Inquiries should be addressed to: Harnischfeger Corporation, Welding Division, 4404 West National Avenue, Milwaukee 14, Wisconsin.

P&H

Overhead Cranes • Electric Hoists
Excavators • Welding Positioners
Arc Welders • Welding Electrodes

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

Canadian Distribution: The Canadian Fairbanks-Morse Company, Ltd.

WYTEFACE
"A"
TRADE MARK
STEEL TAPES

GRADUATED IN INCHES OR TENTHS

EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

EST. 1867
KEUFFEL & ESSER CO.
NEW YORK • HOBOKEN, N. J.
ST. LOUIS • SAN FRANCISCO • LOS ANGELES • DETROIT • MONTREAL

New Trade Publications

Wedge-Slot Screens—A 4-page folder describes a screen made of wedge-shaped profile bars held in position by U-shaped holders for use in a wide range of processing and classifying operations. The applications include dewatering, pulverizing, sewage and industrial waste recovery, filtration, sizing, and water cleaning—*Hendrick Manufacturing Co., Carbondale, Pa.*

Industrial Flooring—This bulletin is illustrated in color and points out a way to cut flooring maintenance costs and reduce slipping accidents. It shows a cross-section, gives test curves for load and strength, presents a simple check-chart for flooring selection, and includes other data of value to anyone interested in a heavy-duty, nonslip industrial flooring.—*Walter Maguire Co., Inc., 330 West 42nd St., New York, N. Y.*

Ditch Dynamiting—This 32-page booklet is particularly timely because of today's shortage of manpower and equipment. Based on years of experience in the field and in the laboratory, the booklet fully explains and illustrates the technique of ditch dynamiting which is being widely used in agriculture, pipeline and highway construction, mosquito and flood control.—*E. I. du-Pont de Nemours & Co., Explosives Department, Wilmington 98, Del.*

Gate Valves—A new gate valve catalog includes illustrations, complete details of design, and dimensional data. It tells of how, in order to achieve perfect alignment of working parts, close fitting wedge guide ribs are constructed by a new method which eliminates unnecessary and wear-producing drag across seating faces. In the valves described seat rings are hard surfaced and welded integrally to the body. Specially built fixtures permit hydrostatic test of both seating faces simultaneously. —*The Edward Valve & Mfg. Co., Inc., East Chicago, Ind.*

Surface Protection—"New Approaches to Surface Protection" is the title of a new pamphlet. It is primarily a technical discussion of protective coatings which take advantage of properties of heat reflectance, a hitherto overlooked principle by which a substantial amount of radiant heat energy is put back to work, instead of being absorbed by heat chamber linings.

This new treatise should prove inter-

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools.

See full page ad page 157

ALABAMA
Birmingham—Tractor & Equipment Co.
ARIZONA
Phoenix — Smith Booth Usher Company
ARKANSAS—Fort Smith — R. A. Young & Son
Little Rock — R. A. Young & Son
CALIFORNIA
Los Angeles — Smith Booth Usher Company
San Francisco—Edward F. Hale Company
CONNECTICUT
Hartford — The Holmes-Talcott Company
GEORGIA
Atlanta — Tractor & Machinery Co., Inc.
ILLINOIS — Chicago — Kennedy-Cochran Co.
INDIANA
Indianapolis — Reid-Holcomb Company
IOWA — Des Moines — Electrical Eng. & Constr. Co.
Davenport — Industrial Engineering Equipment Co.
KENTUCKY — Harlan — Hall Equipment Sales
Louisville—Williams Tractor Company
LOUISIANA
New Orleans — Wm. F. Surgi Equipment Company
MAINE — Augusta — Murray Machinery Co.
MARYLAND
Baltimore — D. C. Elphinstone, Inc.
MASSACHUSETTS
Cambridge—W. W. Field & Son, Inc.
Springfield—The Holmes-Talcott Company
MICHIGAN
Detroit — W. H. Anderson Company, Inc.
MINNESOTA
Hibbing—Arrowhead Equipment & Supply Co.
Minneapolis — The George T. Ryan Company
MISSOURI
Kansas City—Machinery & Supplies Company
MONTANA — Helena — Caird Engineering Works
NEW JERSEY
Hillside—P. A. Drobach
North Bergen—American Air Compressor Corp.
NEW MEXICO
Roswell — Smith Machinery Company
NEW YORK
Albany — Larkin Equipment Company
Albany—T. Southworth Tractor & Machy. Co., Inc.
Menands
Binghamton — MacDougall Equipment Co.
Buffalo—Dow & Company, Inc.
New York—Hubbard & Floyd, Inc.
Olean — Freeborn Equipment Company
Oneonta — L. P. Butts, Inc.
Syracuse — Harrod Equipment Company
OHIO — Cincinnati — The Finn Equipment Company
Cleveland — Gibson-Stewart Company
Marietta — Northwest Supply & Equipment Co.
Toledo — M. W. Kilcorse & Company
OKLAHOMA
Oklahoma City — Townsco Equipment Co.
OREGON
Portland — Andrews Equipment Service
PENNSYLVANIA
Easton — Sears & Bowers
Harrisburg — N. A. Coulter
Oil City — Freeborn Equipment Company
Philadelphia — Metalweld, Inc.
Pittsburgh — John McC. Latimer Company
Wilkes-Barre — Ensminger & Company
SOUTH CAROLINA
Columbia — Bell-Lott Road Machinery Co.
SOUTH DAKOTA
Sioux Falls — Empire Equipment Co.
TENNESSEE
Chattanooga — James Supply Company
Knoxville—Wilson-Weesner-Wilkinson Co.
Memphis — Tri-State Equipment Company
TEXAS — Dallas — Shaw Equipment Company
El Paso—Equipment Supply Company
Houston — Dye Welding Supply Co.
San Antonio — Patten Machinery Company
VIRGINIA
Richmond — Highway Machinery & Supply Co.
WASHINGTON
Seattle — Star Machinery Company
Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont — Interstate Engineers & Constructors
WISCONSIN
Eau Claire — Miller, Bradford & Risberg Company
Madison — Western Equipment Company
WYOMING
Cheyenne — Wilson Equipment & Supply Co.

Get more WORTH from air with WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

DIGGING INTO A 3 BILLION DOLLAR MARKET

Cold facts about Blue Brutes will prove to you they're your best bet for post-war building . . . and cold facts on post-war buying intentions prove your market will be there:

A recent survey shows more than $3,000,000,000 has been budgeted for post-war construction plans, underway or completed today.

To back your bid check these features of Blue Brute Compressors against any other brand.

Feather Valves*, simplest and most efficient, soothe maintenance headaches, lessen repairs and delays.

*Reg. U. S. Pat. Off.

Full force feed lubrication throughout engine and compressor.

3-point Suspension "cradles" both engine and compressor in one integral housing, cushioning shocks and vibration.

Check all their strong points. Then take your choice of models . . . truck-mounted, two or four-wheel spring trailer and skid-mounted . . . Diesel, gasoline or electric driven . . . and team them up with Blue Brute air tools for best results.

Ask your nearest Worthington Representative listed on page 156 what models of compressors and air tools best fit your needs.

PC4-27A

Behind the Fighting Fronts with

BLUE BRUTES

On jungle roads and airports 'round the world . . . on Pacific Islands . . . on bomb-blasted roads speeding U. S. Armies toward victory, Blue Brutes are hard at work today . . . and in hundreds of factories, Navy Yards, air bases . . . on vital supply lines behind the fighting fronts.**

**Blue Brute Compressors and Air Tools are painted olive drab for the Army, battleship gray for the Navy.

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTH BEHIND THE NAME WORTHINGTON

Worthington Pump and Machinery Corporation Construction Equipment Division, Holyoke, Massachusetts

You'll get more of tomorrow's highway contracts . . . . if your pumping costs are the lowest
CARVER Certified PUMPS
CARVERPUMP CO.
MUSCATINE IOWA

Low Cost Water— **by CARVER**

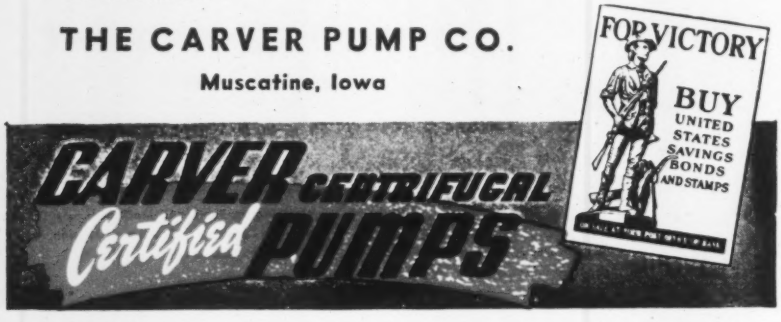
Carver Certified Pumps can save you many hours and dollars on your pumping jobs. Lifetime tungsten carbide seal, special long life impeller and removable liner, and trouble-proof design enable Carver pumps to handle water filled with mud, grit or sand and there will be less time out for maintenance. Low first cost, fast priming, efficient, non-clogging action, mean that Carver pumps get to work faster, stay on the job longer, and, most important of all, pump more water at less cost per gallon.

Every Carver pump carries a "Certified" tag—proof that it fully meets our high standards for performance on the job—your assurance of top performance on your toughest jobs.

For complete information, see your nearby Carver distributor or write direct.

THE CARVER PUMP CO.

Muscatine, Iowa



esting to engineers faced with unfamiliar problems in heat resistance. Refractories, metals, ceramics and glass are substances on which these coatings have already been found effective, and it is believed that many as yet undiscovered uses will disclose themselves. *Preferred Utilities Manufacturing Corp., 1860 Broadway, New York 23, N. Y.*

Thermal Control—A colorful 44 page booklet describes the company's products, and includes installation drawings and photographs for both temperature and pressure control apparatus. One section is illustrated with actual temperature charts and diagrams to illustrate the basic principles involved in accurate temperature regulation. It also covers inspection and testing procedure.—*Fenwal Inc., 200 Pleasant St., Ashland, Mass.*

Forged Steel Flanges—In addition to complete descriptions and specifications of controlled quality forged steel flanges, this catalog also contains valuable engineering information, conversion tables and performance data . . . information that piping engineers use daily. It contains ASA tables on wartime pressure ratings. It provides refinery, heating and piping men and shipbuilders with a valuable ready reference work.—*Ladish Drop Forge Co., Cudahy, Wis.*

Welding Reduction Regulators—A bulletin illustrates the design and construction features of certain types of two-stage reduction regulators employed in the welding industry. It discloses design and construction details which are often hidden from view. This company says it is its policy to disclose all pertinent details in regard to the construction of its equipment.—*Victor Equipment Company, 844-54 Folsom St., San Francisco, Calif.*

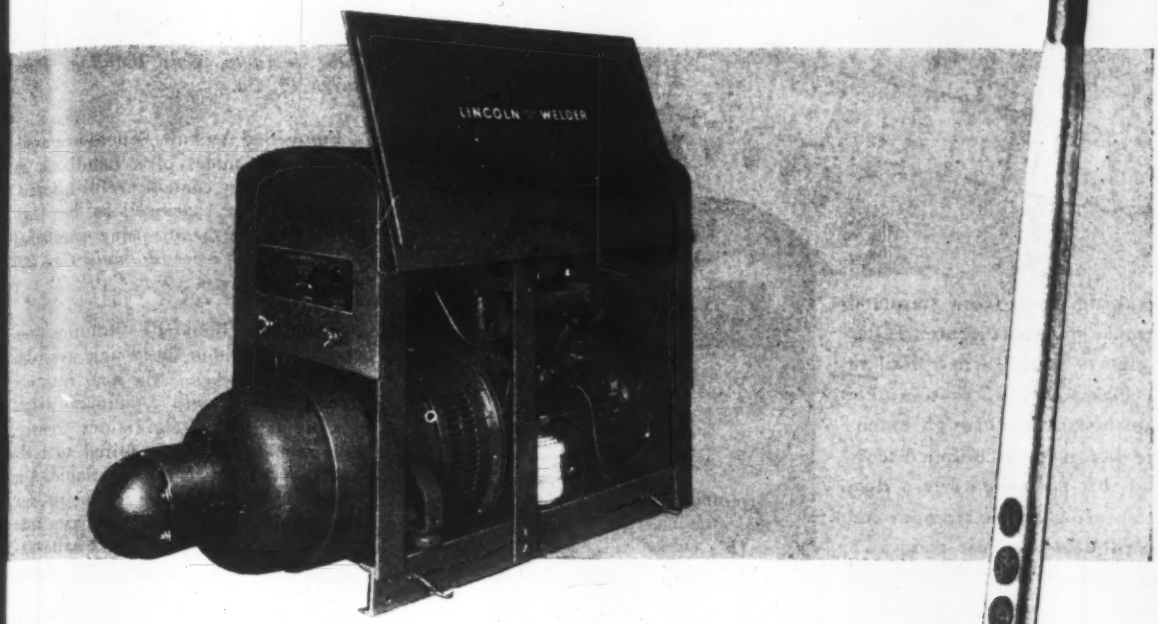
Tubing Data—This new book is divided into four principal sections, with guide index, covering general data, mechanical tubing, pressure tubing, and reference tables. There is a summary on the history, manufacture, tests, special shapes and standard steels with chemical composition, mill practices, etc.

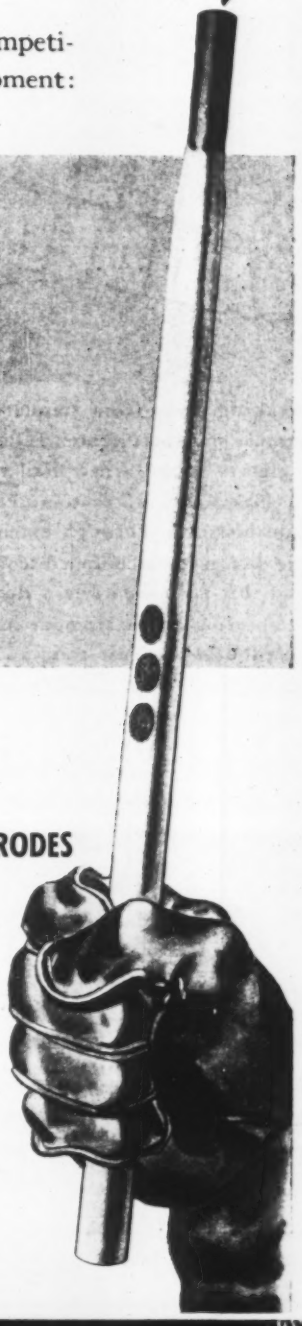
The section on mechanical tubing covers typical uses, suggestions of how to obtain best results through the use of tubing, determining proper size, with complete tolerance tables, properties for beams, and a digest of standard specifications.

The section on pressure tubing covers various pressure formulae, specifications and tolerance tables for boiler tubes, heat exchanger and condenser

WHY WAIT 'TIL YOU'RE CORNERED?" *he says*

LOOK, GENERAL, how some are beating the gun of competition through recourse to this Lincoln Arc Welding equipment:





Gun Beater: THE NEW LOW-COST "SHIELD-ARC" WELDER

A dependable, versatile engine driven welder for shop or field use . . . for fabrication, construction or maintenance welding applications of all kinds.

"Job Selector" provides *known* TYPE of welding arc to match every job and same adjustment sets engine speed at proper minimum rate.

Rated 200-Amps. Capacity for heavy overload when required.

Full details in Bul. 312-C.

Gun Beaters: LINCOLN ELECTRODES

35 types for every essential welding requirement . . . for mild steel (world-famous "Fleetweld") . . . for alloy steels . . . for non-ferrous metals . . . for hard-facing . . . for cast iron.

Look for the 3 dots . . . the sign of genuine Lincoln Electrodes.

Full details and procedures in "Weldirectory," Bul. 402. Free on request.

THE LINCOLN ELECTRIC COMPANY • CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

Breaking away from standard formula and specification, Fuller engineers blazed a new trail in the manufacture of automotive transmissions. Through extensive design research they discovered that *tooth-shape* has a definite bearing on the strength and wear-life of the gear train . . . that proper *shape* produces a more quietly running set of gears, therefore, an easier shifting, longer lasting transmission. Today this is no longer a theory, but a well established fact which you will discover in those trucks equipped with Fuller transmissions. FULLER MANUFACTURING COMPANY, Kalamazoo, Michigan.

FULLER MANUFACTURING COMPANY. KALAMAZOO, MICHIGAN
Transmission Division
Unit Drop Forge Division, Milwaukee, Wisconsin

DRILLING
ANYWHERE

We look into the earth

PENNSYLVANIA
DRILLING COMPANY
PITTSBURGH, PA.

OHIO
LOCOMOTIVE CRANES

20 to 50 TON CAPACITY

DIESEL • ELECTRIC • GASOLINE • STEAM

The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS... OHIO

tubing, still tubes, alloy steel pipe, stainless steel analyses, with metallurgical data.

The reference table section has many formulae, weight tables for rounds, squares, rectangles, surface areas both inside and outside, and other tables commonly found useful in tubing applications.—*Seamless Steel Tube Institute, Gulf Building, Pittsburgh 19, Pa.*

Emulsified Asphalt—There are available bound copies of a handbook on bitumuls. They contain useful information and brief specifications for engineers and contractors using emulsified asphalt.—*American Bitumuls Co., 200 Bush St., San Francisco, Calif.*

Aluminum Booklet—With the prospect of aluminum becoming available in large quantities in the near future, a timely booklet with aluminum weight conversion tables, and tables showing approximately stock required to make 1,000 pieces, etc., is now available. Also discussed are techniques for the production of aluminum machined parts from extrusions of high strength alloys.—*Harvey Machine Co., Inc., 5200 Avalon Boulevard, Los Angeles 3, Calif.*

History of Power Transmission—An unusually interesting and valuable 48-page booklet, covering the development of power transmission from earliest times to present day equipment. *Multiple V-Belt Drive Association, 140 S. Dearborn St., Chicago 3, Ill.*

Conduits—A 20-page catalog contains valuable information with data and specifications on conduits for installation with or without concrete encasement. The conduit described has been used for more than 50 years for housing electric cables installed underground. Made of cellulose fibre vacuum impregnated with coal tar pitch, the ducts do not corrode.—*The Fibre Conduit Co., 292 Madison Avenue, New York 17, N. Y.*

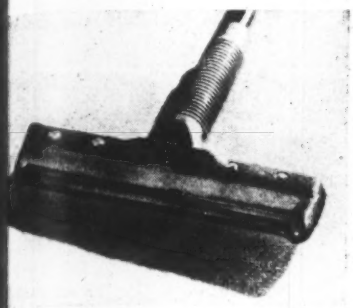
Force Feed Loader—A new 6-page folder entitled "To Help You Maintain Better Highways", featuring a force-feed loader is ready. It illustrates time-and-labor-saving methods of removing and salvaging surplus materials on highway maintenance and construction.—*Athey Truss Wheel Co., 5631 W. 65th St., Chicago 38, Ill.*

Concrete Mixers—A new catalog describes a line of concrete mixers for the construction industry ranging in size from 3½ to 28 cu.ft. capacity. The catalog gives a resume of the operating features and complete specifications.—*Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.*

New Aids to the Constructor

Flame Priming and Descaling Nozzle

One of the chief advantages of a new flame priming and descaling nozzle, the manufacturer states, is its spiral mixer



and gas proportioner, which virtually assures freedom from back-fire or flash-back. Another feature of this nozzle, which may be attached to any standard Victor welding torch butt, is an Airadiator aluminum cooling section at the nozzle head, to keep pre-mixed gases below ignition temperatures.

This nozzle (Model 361) is made in 4-in. ribbon flame width; Model 362 is for 6-in. width. Replaceable Meehanite skid shoes add to the nozzle's wearing life.—*Victor Equipment Co., 844-54 Folsom St., San Francisco, Calif.*

• • •

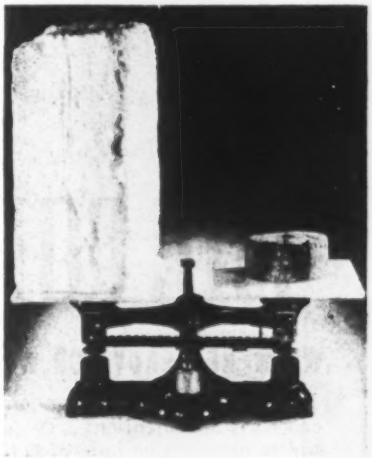
Printer and Developer

New reproduction advantages are offered by the new BW-Copyflex Model 2 continuous printer, it is claimed. This machine duplicates anything drawn, typed, printed or illustrated. With the flick of a switch, the Model 2 becomes a BW printer for exposing black and white prints. Compactly designed, the printer fits in desktop space. It exposes roll stock or cut sheets up to 24 in. wide at a speed of 5 to 30 in. per minute. Because it is a continuous printer, speed of reproduction is said to be considerably increased.

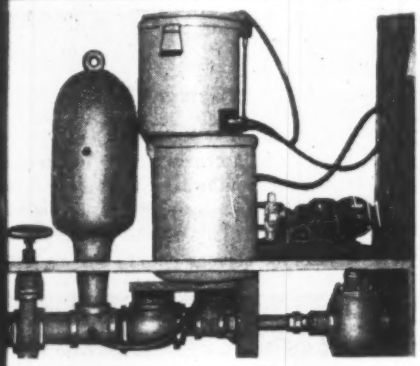
Model 153-M BW developer, for use in conjunction with the Model 2 printer, develops cut sheets or roll stock up to 24 in. at a speed of 12 ft. per minute.—*Charles Bruning Co., Chicago, Ill.*

Plastic Foam

Weighing less than 1½ lb. per cu. ft. (and it can be made to weigh as little as ¾ lb. per cu. ft.), a new plastic foam, "flotofoam," has great buoyancy, and is



semi-rigid. Because this product contains so much air space, insulation and sound-deadening will be important



Bathroom Windows No Longer Open . . .

Thanks to

%PROPORTIONEERS%

In one of our north central states a small town was troubled by hydrogen sulphide odors as well as the questionable quality of one of their soft water well supplies. Frequent flushing of mains was necessary and consumers were forced to open bathroom and laundry windows when drawing large quantities of this water

On decision of the City Council and Superintendent, a %Proportioneers% Heavy Duty Midget Chlor-O-Feeder was installed as shown. For automatic operation, the Chlor-O-Feeder drive motor is cross-connected to well pump motor starting switch. Two ounces of available chlorine are mixed with each 3 gallons of water in 15 gallon crock, and then after settling, clear solution is drawn off into 20 gallon feed tank. 3 to 4 PPM dosage with Midget Chlor-O-Feeder produces 0.3 PPM residual 1,000 ft. from well. Thanks to %Proportioneers% water from this well with the addition of hypochlorite is now free from odor and safe for drinking.

Perhaps conditions are not so embarrassing in your town, but if you have a problem requiring chlorination for safety or odor control, write us today. We will gladly make recommendations.

% PROPORTIONEERS, INC. %
"Chemical Feeder Headquarters"
92 CODDING ST. PROVIDENCE 1, R. I.

THE POINT IS THIS!

WE WERE READY FOR WAR:

Novo's Line of Construction Equipment met Army and Navy Specifications. To get in the fight, it merely had to put on a uniform of G.I. paint. The same fine Novo Engines, Pumps, Hoists, and Generator Sets that have served you for so many years, were ready to serve your Country. Yes, when the Call to Arms came, Novo Construction Equipment was ready for war!

WE'LL BE READY FOR PEACE:

The big Novo Plant won't have to be reconverted. There will be no idle period of preparing for peacetime production. Novo Construction Equipment, tempered by war, will be available for your post-war needs. Come V-Day, Novo will be ready to serve you again without undue delay. Yes, Novo will be ready for Peace . . . . and ready to fill your Construction Equipment needs.

We are currently in production on all items illustrated at the right. While most of our production is reserved for the Armed Forces, we can make limited shipments to Civilians with proper Priority.

Also a member of A.E.D.

NOVO ENGINE COMPANY LANSING, MICHIGAN

NOVO ENGINE COMPANY, 200 Porter St., Lansing, Mich.

Please send me Consolidated Catalogue, No. 4-43, for Novo's Complete Line of Construction Equipment.

NAME:_____

ADDRESS:_____

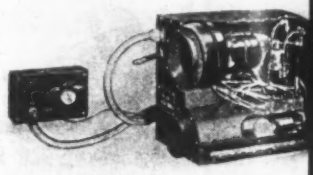
phases of its many peacetime uses.

Flotofoam is made of a combina of synthetic plastic materials, which foamed and then solidified.—*U States Rubber Co., Rockefeller Ce New York, N. Y.*

• • •

Versatile Heater

Using the combustion proces of v entraining, a new Model SAH h heats the cab, defrosts the windsh heats trailer space and preheats teries, engine manifold and crank



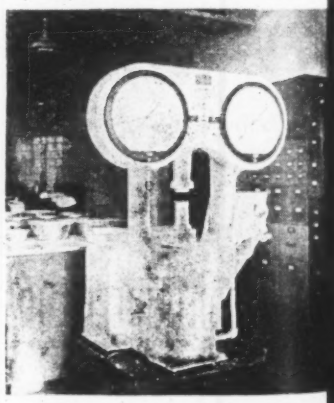
as required, according to the manu turer's announcement. The heat changer has four compartments cross-over passes between.

Designed with only three mo parts, to operate on fuel from the tru supply tank, the heater has outputs f 10,000 to 40,000 Btu per hr. Mou on wheels or skids, it may be used pre-heating engines of bulldo cranes, compressors, etc.—*Fluid H Division, Anchor Post Fence Co., Ba more 24, Md.*

• • •

Cement Tester

Due to the present importance of entraining cements, attention is focu on the Southwark-Emery cement te which tests by compression instead tension. This 90,000-lb. tester, u 2x2-in. cement cubes, has an accu



rate-of-loading control and a sepa weighing system.

Adequate dial scale length and curacy over the operating ranges provided by two dials of 33-in. s length each, one of 90,000 lb. and

DOLLAR for DOLLAR

of First Cost and Operating Cost

THE

3/4-SWING BADGER

MOVES MORE MATERIAL . . . FASTER AND CHEAPER

Check these BADGER FEATURES

- √ Lighter Swinging Weight
- √ Greater Stability
- √ Better Visibility
- √ No Tail Swing
- √ Extra Dumping Height
- √ Extra Reach
- √ Easily Portable
- √ Fully Convertible

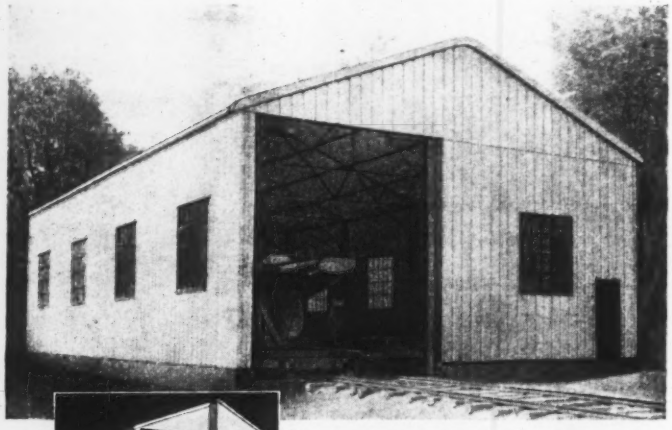
AND ASK YOUR NEARBY A-W DEALER to tell you the whole story of how the versatile BADGER will save time and make money for you.

AUSTIN-WESTERN COMPANY
AURORA, ILLINOIS, U. S. A.

BUILDERS OF ROAD MACHINERY SINCE 1859

Austin-Western

BUY MORE WAR BONDS



★ ★ ★ ★ ★ ★ ★ ★

PREFABRICATED STEEL PANEL BUILDINGS

★ This new low cost all-steel industrial building may be the answer to a post war problem of yours . . . Built of standard panels in multiples of 2'0", buildings range in size from 6' x 6' x 8' to the largest manufacturing plant requirement . . . Windows and doors are built in, and shipped attached to the panels.

★ A wide variety of standard units permit design to exactly fit your individual needs. These prefabricated steel-panel buildings can be expanded, altered or moved to a new location with 100% salvage . . . All parts are shipped in bundles. Complete foundation and erection plans permit erection with unskilled labor.

Write for full information on these new low cost packaged buildings.

ARMY E NAVY

★ A request on your firm letterhead will bring you a complete file of literature on other International products, including trusses, structural steel and hangars.

International STEEL CO.

★ STRUCTURAL STEEL
★ STEEL BUILDINGS
★ STEEL TRUSSES
★ BUILDING PRODUCTS

1704 EDGAR STREET
Evansville 7, Indiana

of 10,000-lb. capacity.—*The Baldwin Locomotive Works, Philadelphia, Pa.*

• • •

Pneumatic Saw

Marine and building contractors may adapt the Davey pneumatic saw to cap piling in drydock and wharf construction. This device (which will be manu

factured on request but which may be made by the contractor to suit his specific need), consists of two lengths of pipe or bar stock, secured fore and aft beneath the unit. This acts as a guide runner on the battens, and is said to insure a uniform, level cut within the tolerances of the battens.

An inquiry to the manufacturer will bring full information about this time saving and accurate appliance.—*Davey Compressor Co., Kent, Ohio.*

• • •

Bituminous Mix Computor

Paving engineers and contractors can easily calculate the tonnage of bituminous mix needed for any job, it is claimed, with a new slide rule computor. This rule is designed to accommodate any variation in density of the mix, for any length, width or thickness desired

from driveways to airport runways.

The slide rule is available at present with a celluloid face; later a plain wooden model may be obtained.—*Kotal Co., 52 Vanderbilt Ave., New York 17, N. Y.*

• • •

Type Cleaner

Office machines, using a ribbon and type, that must be made to outlast the war can be cleaned safely and efficiently with Durol type cleaner, the manufacturer states. This cleaner quickly removes dust and greasy deposits from type bars, type keys and platen rollers.—*Reliance Pencil Corp., Mount Vernon, N. Y.*

The BIG
PITTSBURGH
IMO
SCREW PROPULSION TYPE
This exclusive all-rotating design combines the maximum in low flow accuracy and sustained accuracy with silent operation, long life, and a minimum of maintenance. Made in sizes ⅝", ⅝ x ¾", and 1".
Empire STREEEMLINE
OSCILLATING PISTON TYPE
Provides the superior performance characteristics of the time-proven EMPIRE balanced oscillating piston design, originated and patented over 60 years ago. Made in sizes ⅝", ⅝ x ¾", ¾", and 1".
PITTSBURGH ARCTIC
(ALSO MADE IN SPLIT-CASE TROPIC)
NUTATING DISC TYPE
For the ultimate in disc meter satisfaction. Rigid manufacturing controls, skilled assembly, and exacting test make these meters top dollar value in the general service field. Made in sizes ⅝", ⅝ x ¾", ¾", and 1".

THREE

IN DOMESTIC WATER METERS

PITTSBURGH-NATIONAL is the only manufacturer making all types of domestic meters. It is obvious that good meters, like any other product, can be made in several designs to suit different requirements. No single type of meter can successfully and economically meet all conditions. If the cost of pure water is low, and if it can be delivered without heavy expense for pumping, filtration, and treatment, it may not be wise to install the highest priced meter just because it is the most accurate. If, on the other hand, water is scarce and requires costly treatment with heavy pumping charges from protected drainage areas of distant source, it is very necessary in the interests of efficiency and economy to use the most accurate meter obtainable.

In the complete PITTSBURGH-NATIONAL line will be found the proper type of domestic meter to meet any measurement requirement. Each is manufactured to the highest standards of quality. Let our experienced service engineers analyze your measurement requirements.

Important!

BRONZE CASE METERS

An amendment to WPB Order L-154 now permits the manufacture of bronze case meters in sizes ⅝-inch through 1-inch. All the meters shown here are made with the best quality cast bronze outer housings for maximum corrosion resistance.

PITTSBURGH EQUITABLE METER CO.
MERCO NORDSTROM VALVE CO.
Main Offices, PITTSBURGH, PA.
Atlanta Boston Brooklyn Buffalo Chicago
Columbia Houston Kansas City Los Angeles
New York Pittsburgh San Francisco Seattle Tulsa
National Meter Division, Brooklyn, N. Y.

PITTSBURGH-EMPIRE *Water Meters*

IT'S NO FEAT

to turn out professional-looking, neat-as-a-pin drawings *fast* with any one of the four widely-known Arkwright Tracing Coths.

CAN'T BE BEAT!

For real high-grade work, the uniformly-woven base cloth and specially processed surface of Arkwright Tracing Cloths, entirely free from imperfections, just can't be beat.

TRY A SHEET!

Send today for free samples of Arkwright Tracing Cloths . . . see the difference they make in your work. Arkwright Finishing Company, Providence, Rhode Island.

Sold by leading drawing material dealers everywhere

Arkwright
TRACING CLOTHS
AMERICA'S STANDARD FOR OVER 20 YEARS

Manufacturers' Activities

GEORGE T. ABERNATHY has been appointed hydraulic engineer of the Newport News Shipbuilding and Dry Dock Co. He is a native of Pulaski, Tenn., and took his B.S. in civil engineering, 1929, at the University of Tennessee. He joined the Hydraulic Turbine Division of Newport News Shipbuilding and Dry Dock Co. in 1929. He was acting assistant plant engineer November, 1941, to August, 1944, being engaged in plant extension incidental to the accelerated naval war program. He was appointed hydraulic engineer last August 1, to succeed Roger V. Terry, assistant chief engineer, formerly hydraulic engineer.

Horace P. Clark has been elected president of the H. W. Clark Co., Mattoon, Ill., manufacturers of water and gas service line materials, succeeding his brother, the late Donald M. Clark, who died recently at 47 after more than 20 years service with the company.

Horace P. Clark, as former secretary and sales manager of the company has been connected with the organization for the past 15 years, serving the company in various capacities in the factory and in the field.

H. W. Clark, father of Donald M. and Horace P. Clark, was founder of the company.

CUTLER-HAMMER, INC., electrical manufacturers, Milwaukee, Wis., has announced the appointment of J. M. Cook as manager of the San Francisco district sales office.

Mr. Cook was graduated from the University of Minnesota in 1928 with the degree of B.S. in electrical engineering. He joined the Cutler-Hammer organization in August, 1928, com-

One name stands out

PIONEER

From the day when the first Pioneer Portable gravel plant was towed to a road-side pit to produce aggregate for Wisconsin's specifications, one name has stood out. In pit, quarry and mine you see the name Pioneer on gravel plants, washers, crushers, screens, conveyors, bituminous plants. Pioneer leads in the qualities that make equipment pay.

Pioneer stands for sensible, simple engineering—design that meets the job requirements—rugged construction for rugged work—low maintenance costs.

That these dependable qualities are present in greater measure in Pioneer equipment is manifest by the many contractors who year after year have relied exclusively on Pioneer.

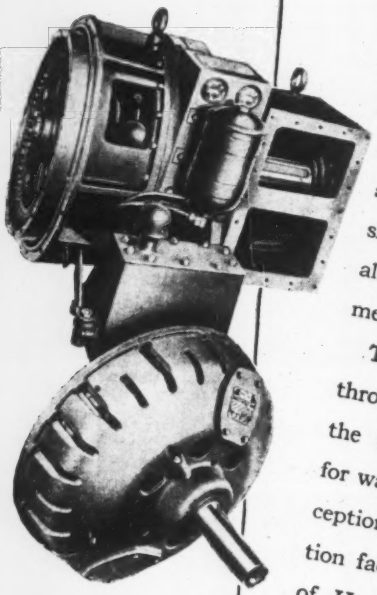
Pioneer is proved equipment — and the right combination of Pioneer units will make more money for you. Pioneer engineers are ready to help you now.

Pioneer
ENGINEERING WORKS
Crushers, Screens, Feeders and Portable Plants

ENGINEERS and MANUFACTURERS of QUARRY-GRAVEL AND MINING MACHINERY

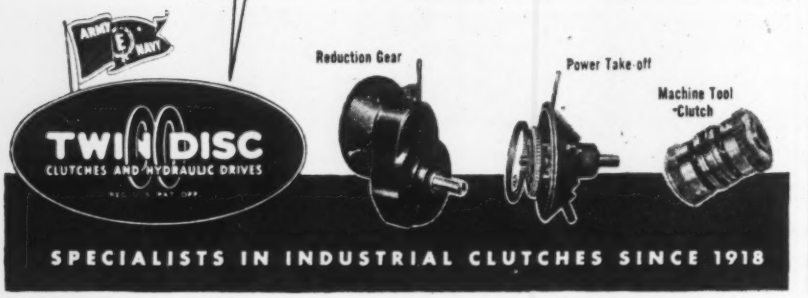
MINNEAPOLIS 13, MINNESOTA

"FLUID" FIGHTING UNITS ...Now and Later



The same transmission principle which has been a distinguishing feature of American tanks and tractors . . . given them the ability to negotiate rough terrain or quickly accelerate and take advantage of short, smooth stretches . . . will give all heavy-duty road building equipment a new operating efficiency.

The Twin Disc Clutch Company, through its intimate experience in the building of hydraulic drives for war services, has developed exceptional engineering and production facilities for the manufacture of Hydraulic Torque Converters (Lysholm-Smith type) and Hydraulic Couplings. That's why Twin Disc welcomes an opportunity to counsel with you on your plans for new dirt-moving equipment. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



pleted the company's student train course, and entered the hea quarte sales department. In 1929 he joined Milwaukee district sales office as an a plication engineer. In 1933, Mr. Co transferred to the Cincinnati distri office where, for the past 11 years, has been handling industrial sales manufacturers of electric motors, mot driven machinery, machine tools and the steel mills of the Cincinnati distri

The LeRoi Co., Milwaukee, Wis., h announced that C. F. Hall has be named manager of its newly established sales office in Birmingham, Ala.

An employee of the company for the past 10 years in various sales and service capacities, Mr. Hall will serve the entire southeastern United States territory.

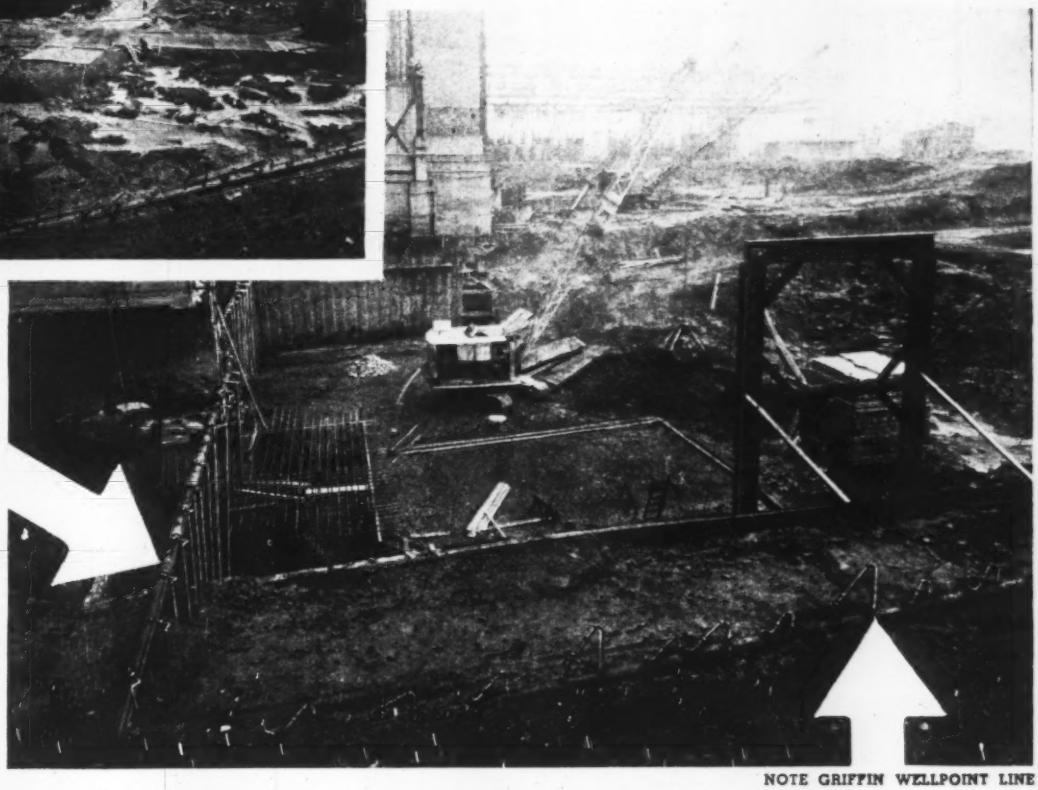
Noel V. Wood, Inc., 1331 Wood wether Road, Kansas City, Mo., di tributors of tractors, road grader shovels, compressors and cranes, h appointed Arthur F. Luder, former with the War Production Board, general sales manager.

William S. Wilbraham, since 19 manager of costs and more recently a sistant to the general manager of Lukenwald, Inc., division of Lukens Steel Co., has been appointed production manager. Mr. Wilbraham is a graduate of Drexel Institute of Technology with a degree of Bachelor of Science in mechanical engineeri He joined Lukens Steel in March, 19 as an estimator in the sales departme after a year and a half as an assista engineer with the American Bridge In 1932 he became manager of sa for Lukenwald and in 1943 was ma manager of costs. Mr. Wilbraham w have general supervision of product planning and control, procurement, i dustrial engineering, estimating a plant maintenance, and of the person involved.

George H. Charls, former president the United Alloy Steel Corp., died Cleveland, Ohio, recently. In 1919, left his position as a vice-president the American Rolling Mill Co., Hamilton, Ohio, to become vice-pre dent and general manager of the Berg Manufacturing Co. and the Stark Ro

Another Griffin Wellpoint Job—

BEFORE . . . A QUAGMIRE
16 ft. of water—saturated silt!



NOTE GRIFFIN WELLPOINT LINE

AFTER—DRY AND FIRM... GRIFFIN GETS RESULTS

In the lower photo note that the crane mats were put aside after the Griffin Wellpoint System had stabilized the subgrade. Crane works right on bottom 19 feet below original water level. Steel Sheeting was eliminated except where specified at the existing structure.

ALL OTHER BANKS SLOPED—A REAL SAVING
RESULTS COUNT—WHY SAY MORE?

FOR SALE

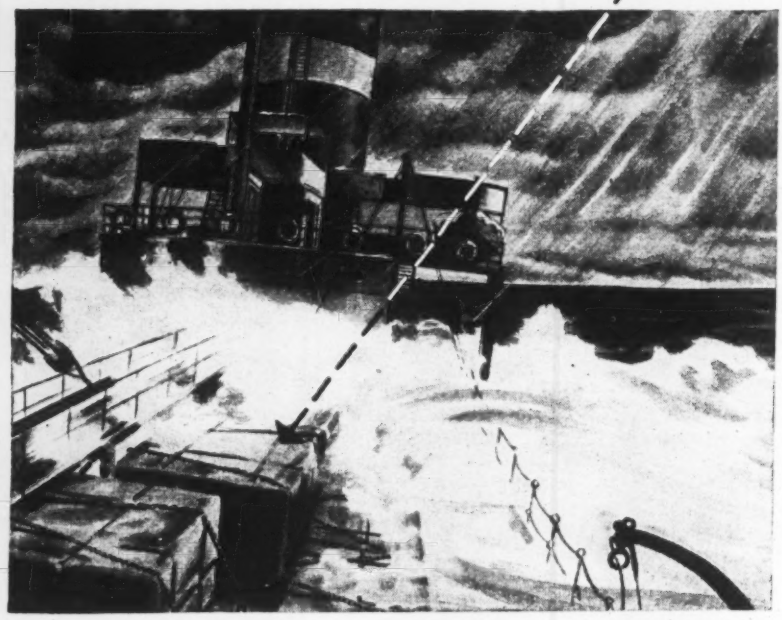
MID-WEST
GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

SOUTH
GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4518
JACKSONVILLE, 4, FLA.

FOR RENT

MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.
GRIFFIN WELLPOINT CORPORATION

THIS IS THE PUNISHMENT SISALKRAFT IS TAKING IN WAR SERVICE!

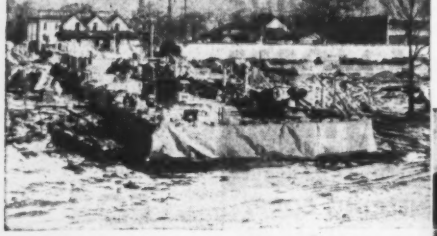


PUT SISALKRAFT FIRST ON YOUR POSTWAR LIST!

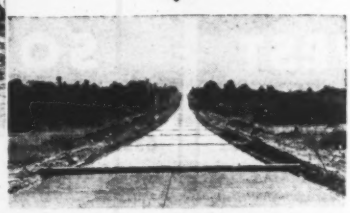
Normally used for concrete curing, SISALKRAFT is protecting deckloads of war supplies exposed to arctic ice and tropical humidity — to sleet, snow, rain, wind and dirt!

Can you think of a more severe test than this direct exposure to the elements and the rough, hurried handling that war supplies must take?

Those very same properties that enable SISALKRAFT to protect war supplies are the ones you need for protecting newly poured concrete from rapid evaporation and from damage by frost, drip and debris.



Put SISALKRAFT *first* on your postwar list — for concrete curing and general job protection. Its low cost, long life and outstanding performance are a record of nearly 25 years of satisfactory service.



THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

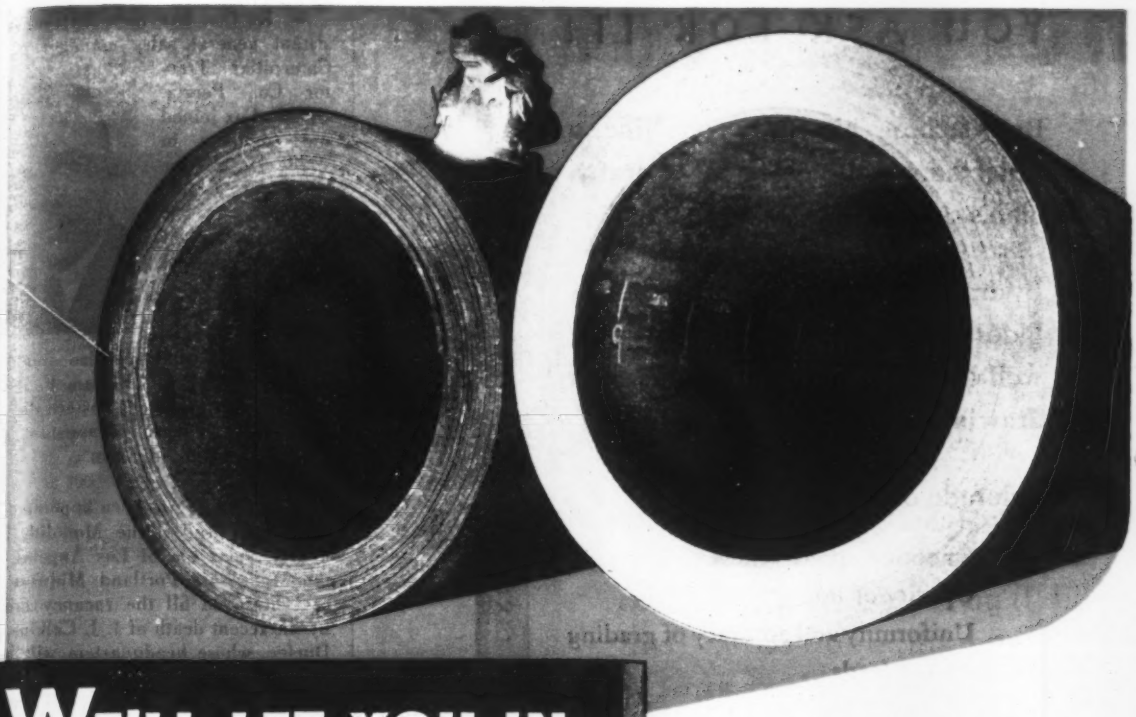
ing Mill Co. at Canton, Ohio. Three years later he was named president of the United Alloy and also headed the Hot Rolled Steel Co. in Canton. In 1928 he became president of the National Association of Flat Rolled Steel Manufacturers. He later was vice-president of the American Iron & Steel Institute in New York. In 1933 he aided in drafting the NRA steel code.

Dravo Corp., Pittsburgh, Pa., has announced the election of L. A. Merrill as vice-president. He will continue as treasurer. Other officers recently announced are: C. A. Hill, comptroller, formerly secretary and auditor; C. E. Walker, secretary and auditor, formerly assistant to president.

George L. Snyder, since 1938, chief engineer of Lukenweld, has been appointed chief engineer and assistant to the general manager. He is a graduate of Drexel Institute of Technology with a degree of Bachelor of Science in mechanical engineering, obtained through the cooperative plans by which, over a period of four years, he alternated six months of schooling with a similar period as a draftsman at Lukenweld. Upon graduation from Drevel he worked at Lukenweld as an engineer, becoming assistant chief engineer in 1937 and chief engineer in 1938. In addition to his duties as head of all Lukenweld engineering, Mr. Snyder will have general supervision of inspection.

James L. Dunn, assistant manager of the Bridgeport plant of Jenkins Bros., manufacturers of valves and rubber products, has been elected vice-president in charge of industrial relations. Mr. Dunn, with Jenkins Bros. since 1913, will participate in collective bargaining activities; act as liaison between management and labor, formulate policies with the company industrial relations committee, and see that they are carried through; and guide the activities of the labor-management committee.

Mr. Dunn, starting as a clerk with Jenkins Bros., rose to production manager, business manager, and then assistant plant manager.



SMITHway Electrodes in action on sections for a SMITHway Multi-Layer Vessel (on the right after machining); 42 inches in outside diameter with 5½-inch wall thickness; for operation in a war plant at 4,500 pounds per square inch.

WE'LL LET YOU IN ON THE SECRET OF THIS WEAPON

WHEN the war started, everybody — including the Axis — was sure American industry couldn't build enough high-pressure vessels to produce the immense quantities of explosives necessary for waging global war. There just wasn't enough forging capacity available to turn out these giants, but Multi-Layer welded construction, pioneered by the A. O. Smith Corporation, solved the problem.

What does this mean to you? Just this: if you do big, tough welding jobs, we can supply you with the same kind of SMITHway Certified Welding Electrodes that we use in the production of some of the world's largest, most exacting welding jobs.

SMITHway Certified Welding Electrodes are the best that money can buy because we have a double interest in making them right. No other electrodes go through as thorough production controls — are so scientifically checked and rechecked both in the laboratory and on the production floor.

The code number on every box of SMITHway Certified Welding Electrodes is your assurance that they will give you better welding results at lower costs on the big jobs that you and we call upon them to do. Specify SMITHway Certified Welding Electrodes. Made *by* welders — *for* welders.

Mild Steel . . . High Tensile . . . and Stainless Steel

WELDING ELECTRODES

made by welders . . . for welders

Have You Bought That Extra War Bond This Month?

SMITHway Welding Monitor cuts the time of training welders as much as 33⅓%.

SMITHway AC Welding Machines reduce spatter, completely eliminate "arc blow."

A. O. SMITH Corporation

MILWAUKEE • WISCONSIN • HOUSTON • TEXAS

Offices in: NEW YORK, PITTSBURGH, CHICAGO, TULSA, HOUSTON, LOS ANGELES, SEATTLE

In Canada — JOHN INGLIS CO., LIMITED

YOU ASK FOR IT!

By watching him draw one line, a Chief knows the extent of a draftsman's skill.

By drawing one line with a Typhonite Eldorado pencil, *you* will know how well-deserved is the fame of this great drawing tool.

Eldorado offers you:

Smooth responsiveness
Opacity of line
Uniformity and accuracy of grading
Strong leads

These fine qualities have given Dixon's Typhonite Eldorado first place in the minds—and hands—of America's draftsmen.

So ask for it.

Just fill in and mail the coupon below. A sample will convince you that you should ask for it for your work.

TYPHONITE
ELDORADO

Pencil Sales Dept. 227-J10
Joseph Dixon Crucible Co., Jersey City 3, N. J.

Gentlemen:
Please send me a free "Comparison Sample" of Typhonite Eldorado drawing pencil in ..... degree.

Name.....

Address.....

City..... State.....

W. K. Cox has been appointed assistant general sales manager of the Caterpillar Tractor Co., Peoria, Ill. Mr. Cox joined the company in 1928. During the early part of the war he spent one year as manager of the expediting division, set up to speed delivery of purchased raw materials. The company also announced the appointment of William F. Zeigler as sales manager of the eastern division and F. D. Haberkorn, assistant sales manager of that division.

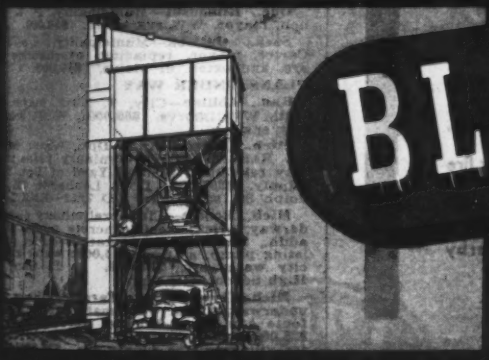
D. R. DURFEE has been appointed secretary-treasurer of the Monolith Portland Cement Co. of Los Angeles, and the Monolithic Portland Midwest Co. of Denver, to fill the vacancy created by the recent death of J. J. Calkins. Mr. Durfee, whose headquarters will be in Los Angeles, has been assistant secretary-treasurer since 1921. P. Carmichael, formerly auditor of the Monolith Co., has been named assistant to Mr. Durfee.

Over 30 manufacturers' representatives met with the employees of the H. O. Penn Machinery Co. on a recent Saturday for an outing at Carmel, N. Y. At the luncheon E. R. Galvin, president of Tyson Bearing Corp., presided and among the speakers were: W. Buchanan, vice-president and general sales manager of the LaPlant Choate Manufacturing Co.; F. Leslie Jones, eastern district manager of the Bucyrus-Erie Co.; Louis E. Dauer, vice-president of the Trackson Co.; Henry Hale, director of the construction machinery division of the W.P.B.; Lewis S. Graham, president of D, A. Lubricants; B. M. Clark, sales manager of The Heltzel Steel Form & Iron Co.; Theron Howard, sales and service manager of the Hyster Co.; C. K. Durfee, president of the Athey Truss Wheel Co.; R. P. Brenner, sales manager of The T. L. Smith Co.; Arthur J. Carlet, New York lawyer; Joseph C. Fiore, eastern district representative of the Friend Manufacturing Co.; W. W. Lowland, eastern district representative of the Barco Manufacturing Co.; J. Overs, factory sales representative of The Cleveland Trencher Co.; R. Heckathorne, district representative of the John Deere Plow Co.; M. V. Pe, New York district representative of the Independent Pneumatic Tool Co., and W. S. Zeigler, eastern district sales representative, Henry H. Howard, general sales manager and W. K. Co, assistant general sales manager, of the Caterpillar Tractor Co.

FASTER CONSTRUCTION

AGGREGATE BATCHING PLANTS

STEEL FORMS
FOR GENERAL CONCRETE CONSTRUCTION



BULK CEMENT PLANTS

That unbeatable combination of *correct design, rugged construction* and *assured performance* has made Blaw-Knox equipment first choice of construction men who have a reputation for getting things done in a hurry...You'll find this trouble-free equipment hard at work building roads, airports and general concrete construction all over the world.

You can depend on your nearest Blaw-Knox Distributor to handle your inquiry promptly and efficiently.

BLAW-KNOX

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2001 FARMERS BANK BLDG., PITTSBURGH (22) PA.
New York • Chicago • Philadelphia • Birmingham • Washington
REPRESENTATIVES IN PRINCIPAL CITIES

KNOW YOUR BLAW-KNOX DISTRIBUTOR

NORTH CAROLINA
Raleigh — Carolina Tractor & Equip Co.
Salisbury — Carolina Tractor & Equip Co.
NORTH DAKOTA
Fargo — Dakota Tractor & Equipment Co.
OHIO
Cleveland — H. B. Fuller Equipment Co.
Columbus — W. W. Williams Co.
OKLAHOMA
Tulsa — Leland Equipment Co.
OREGON
Portland — Contractors Equipment Corp.
PENNSYLVANIA
Philadelphia — Giles & Ransome
Pittsburgh — Dravo-Doyle Company
RHODE ISLAND
Boston, Mass. — The Equipment Co.
SOUTH CAROLINA
Columbia — Jeff Hunt Road Machinery Co.
SOUTH DAKOTA
Rapid City — J. D. Evans Equip. Co.
TENNESSEE
Chattanooga — Nixon-Hasselle Co.
Knoxville — Wilson-Weesner-Wilkinson Co.
Nashville — Wilson-Weesner-Wilkinson Co.
Memphis — Road Bldrs. Equip. Co.
TEXAS
Dallas — Conley-Lott-Nichols Mach. Co.
Houston — R. B. Everett & Co.
UTAH
Salt Lake City — Lund Machinery Co.
VERMONT
Barre — Casellini-Venable Corp.
VIRGINIA
Richmond — Rish Equipment Co.
Roanoke — Rish Equipment Co.
WASHINGTON
Seattle — Star Machinery Co.
Spokane — Empire Equipment Company
WEST VIRGINIA
Charleston — Rish Equipment Co.
Clarksburg — Rish Equipment Co.
WISCONSIN
Milwaukee — Hunter Tractor & Mach. Co.
WYOMING
Billings, Mont. — Western Const. Equip. Co.
Denver, Colo. — Ray Corson Mach. Co.
ALASKA
Seattle, Wash. — Northern Commercial Co.
CANADA
Montreal — Watson Jack & Co., Ltd.
Toronto — W. L. Ballantine Co.
Vancouver, B. C. — B. C. Equip. Co., Ltd.
Winnipeg — Kane Tractor & Equip. Co.
Saskatoon — Richardson Road Mach. Co.
NEW FOUNDLAND
St. Johns — Dominion Distributors Co.

40 YEARS EXPERIENCE

wrapped up with every foot of

CONTINENTAL HOSE

In Hose Making **there is no substitute for experience. The finest materials, methods and facilities are not enough—it's still primarily a matter of experience to build industrial hose that will stand the gaff. That's true regardless of the hose you use—suction, steam, water, air, vacuum, gasoline, oil or fire hose. Continental provides the right hose for the job and serves you through its nearby factory branch warehouses.**

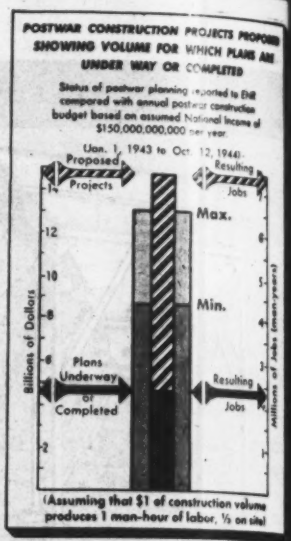
BRANCHES

Baltimore, Md.	Cleveland, Ohio	Kansas City, Mo.	Philadelphia, Pa.
Boston, Mass.	Dallas, Texas	Los Angeles, Cal.	Pittsburgh, Pa.
Buffalo, N. Y.	Dayton, Ohio	Memphis, Tenn.	Rochester, N. Y.
Chicago, Ill.	Detroit, Mich.	Milwaukee, Wis.	San Francisco, Cal.
Cincinnati, Ohio	Indianapolis, Ind.	New York, N. Y.	St. Louis, Mo.

CONTINENTAL RUBBER WORKS

ERIE, PENNSYLVANIA, U. S. A.

POSTWAR PROJECTS


POSTWAR CONSTRUCTION PROJECTS PROPOSED SHOWING VOLUME FOR WHICH PLANS ARE UNDER WAY OR COMPLETED
Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year.
Jan. 1, 1943 to Oct. 12, 1944
Proposed Projects
Resulting Jobs
Max.
Min.
Billions of Dollars
Millions of Jobs (man-years)
Plans Underway or Completed
Resulting Jobs
(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

Projects proposed for postwar constr tion have been published in these umns since January, 1943 as they h been reported to ENGINEERING NE RECORD.

Statistics based on these reports used by the Committee on Postwar C struction of the American Society of C Engineers to measure the progress plans for postwar projects.

The chart above shows, both in e mated dollar volume and in jobs or m years of labor, how fast this reservoi future work is filling up.

WATER SUPPLY

PROPOSED WORK

★**Mich., Saginaw and Midland**—Sagin Midland Special Water Dpt., Sagi Whitestone Point water supply, from L Huron. $7,400,000.

★**Wash., Spokane**—City reservoir $36 pump. station and wells, $358,290; wa mains $216,000; supply main replacem $121,500; water tower $120,000, transmi mains $237,000.

N. S., Kentville—Municipality, A. T. M donald, clk., WW $30,000; equip., $20,00

Que., Rimouski—Municipality, P. E. C non, mayor, WW sys. exten. $40,000.

Sask., Outlook—Municipality, c/o J. Carter, mayor, replacing, overhauling sys. and exten. of mains. $40,000.

PLANS UNDER WAY

Kan., Abilene—City, T. Nusz, mayor, Hall, WW imprvs. $50,000. W. F. Johns city engr.

Mich., Detroit—City Dpt. Water Sup 735 Randolph St., preliminary plans un way rebuilding Central Yard of Dpt. W Supply. $395,000. L. G. Lenhardt, 735 R dolph St., supt.-mgr. CD 7/13—ENR 7/

Mich., Ecorse—City, preliminary plans derway, brick, steel, concrete pump. sta addn., $35,000; pump. station outlet for isting pump. station, $45,000; water gala city water sys., $25,000. L. R. Gare, High School, city engr.

Mich., Grosse Pointe Farms—Village, underway, 12 in. watermain exten. in C fonte Ave., from Morross Rd. to Fisher $23,000; addn. to filtered water reser for village water supply sys., $25,000; 16 lin. ft. new watermain, $35,000. M. Smith, village engr. CD 4/14—ENR 4/

Mich., Lincoln Park—City P. Wks. D 1612 Howard St., preliminary plans un way water main exten., 30,000 ft. 4 an in. c.i. mains, with gates, connections, $50,500; plans underway pump. station ad $90,000. E. H. Pate, 632 Michigan B Detroit, city engr.

★**Mich., Royal Oak**—City, City Hall, P underway fire hydrants with nec connections and main extens. to supplem present sys., $64,000; new water supply s for augmenting present supply, $6 watermain extensions in Sect. A, $25 Sect. B, $187,000; Sect. C, $139,000; Sect. $350,000; Sect. E, $154,000. E. Shafter, 3 Third St., Royal Oak, city mgr. CD 8/ ENR 3/9.

Sensitized PAPERS

BROWN PRINT (NEGATIVE)
POST SEPIA OR SOLAR PAPER
Finest on the market for making negative or silver prints and positive brown prints - strength with high transparency - natural bond or transparentized

BLUE PRINT
POST BLUE PRINT PAPER
Sharp detail on deep blue solids - uniform coating - long keeping all speeds - special sensitizing for blue line printing

DIRECT POSITIVE MOIST DEVELOPED
POST BLACLINE
Prints direct - strong sharp dense black line - greater legibility - speed - long-keeping developing solutions

DIRECT POSITIVE AMMONIA DEVELOPED
BLUE-RED POST VAPO PAPER
Red or blue lines on white - sharp deep detail from any subject that can be blueprinted
BROWN TRANSPARENT POST VAPO-VEL
New transparent brown line ammonia developed paper - multiple copies with printing quality equal to original

POST
DRAFTING MATERIALS

SEND FOR SAMPLES

Chances are—once you've used them—that you'll prefer POST Sensitized Papers. Users get best, longest-lasting results from them and order more—for POST Sensitized Papers have been *proved and improved* year after year. For free testing samples of any one of the five most popular types of Post Sensitized Papers—send today.

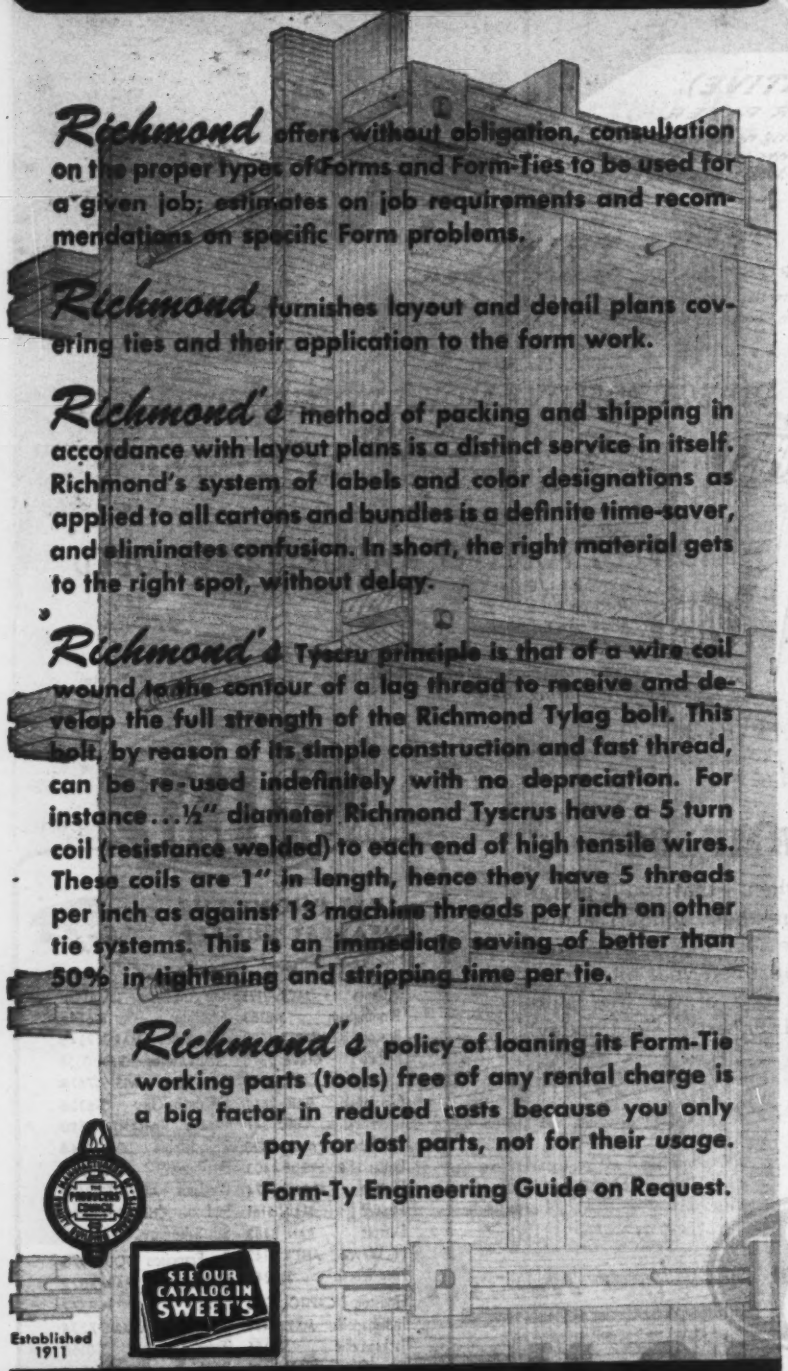
JUST PHONE THE NEAREST NUMBER

Atlanta	JACK. 2121	Los Angeles	TRI. 8164
Birmingham	3-8183	Memphis	8-6796
Boston	LIBERTY 4690	Milwaukee	MARQ. 7246
Buffalo	CLEVE. 0370	New Orleans	RAY. 0331
Chicago	KEY. 7000	New York	WIS. 7-7678
Cincinnati	MAIN 2664	Oklahoma City	3-6306
Cleveland	CHE. 7347	Omaha	ATLANTIC 7890
Columbus	MAIN 3420	Philadelphia	LOM. 7044
Dallas	RIVERSIDE 4403	Pittsburgh	ATL. 3350
Dayton	ADAMS 9174	Portland	ATWATER 8681
Denver	MAIN 5161	St. Louis	CHESTNUT 0688
Detroit	RAN. 8483	Salt Lake City	4-7823
Ft. Wayne	ANT'Y 4142	San Francisco	DOU. 5975
Fort Worth	3-3244	Seattle	MAIN 4022
Houston	CAPITOL 1233	Tampa	M-8377
Indianapolis	MKT. 4466	Toledo	ADAMS 7224
Jacksonville	5-2166	Tulsa	3-0168
Kans. City	VICTR 7881	Washington	NATL. 4063
Knoxville	3-4944	Wichita	2-2722

or mail to
The Frederick Post Company
Main Office: Chicago
Branches: Detroit • Houston
Los Angeles • Milwaukee

POST
HOUSTON
The Frederick Post Company
1215 CAPITOL AVE. CAPITOL 1233

PLANNED FORM WORK
SPEEDS CONCRETE CONSTRUCTION



Richmond offers without obligation, consultation on the proper types of Forms and Form-Ties to be used for a given job; estimates on job requirements and recommendations on specific Form problems.

Richmond furnishes layout and detail plans covering ties and their application to the form work.

Richmond's method of packing and shipping in accordance with layout plans is a distinct service in itself. Richmond's system of labels and color designations as applied to all cartons and bundles is a definite time-saver, and eliminates confusion. In short, the right material gets to the right spot, without delay.

Richmond's Tyscru principle is that of a wire coil wound to the contour of a lag thread to receive and develop the full strength of the Richmond Tylag bolt. This bolt, by reason of its simple construction and fast thread, can be re-used indefinitely with no depreciation. For instance...½" diameter Richmond Tyscrus have a 5 turn coil (resistance welded) to each end of high tensile wires. These coils are 1" in length, hence they have 5 threads per inch as against 13 machine threads per inch on other tie systems. This is an immediate saving of better than 50% in tightening and stripping time per tie.

Richmond's policy of loaning its Form-Tie working parts (tools) free of any rental charge is a big factor in reduced costs because you only pay for last parts, not for their *usage*.

Form-Ty Engineering Guide on Request.

SEE OUR CATALOG IN SWEET'S

Established 1911

RICHMOND SCREW ANCHOR COMPANY, INC.

[illegible] LIBERTY AVENUE • BROOKLYN, NEW YORK

POSTWAR PROJECTS (Cont'd.)

Miss., Hattiesburg—City, plans [illegible] pleted main exten., filter equip. addn. [illegible] 000. Financing not provided for. J. Estes, city engr.

Miss., Vicksburg—City, c/o A. H. Dem plant engr., addnl. filter unit at munici WW, 650,000 gal. per hr. cap., incl. ad 12 in. supply line. H. A. Meng, Hamme Ind., consult. engr.

Mo., Pleasant Hill — City, J. H. Sw mayor, water supply and treatment pla $130,000. J. W. Shikles & Co., Reliance Ba Kansas City, Mo., consult. engrs.

Okla., Anadarko—City, R. J. Callah mayor, City Hall, watermain exte $100,000. Legal obstacles to be overco and financing not yet provided for. N. Kunkel, City Hall, engr.

Okla., Ardmore—City, Q. Wicker, may City Hall, watermain extens., $45,000. Mathews, City Hall, engr. Financing yet provided for.

Okla., Dewey—City, plans 10% comple watermain exten., and addnl. water s $35,000. Black & Veatch, 4706 Bway., Ka sas City, Mo., consult. engrs. Financing yet provided for.

Okla., Shawnee—City, E. Thompson, ma City Hall, plans 25% completed WW i prvs. $50,000. W. R. Holway, 302 E. 11 Tulsa, consult. engr.

Okla., Vinita—City, plans 75% comple new 14 in. pipeline from intake to filter pla elevated storage tank and concrete und ground water reservoir. $350,000. Financ not yet provided for. W. R. Holway, 30 15 St., Tulsa., consult. engr.

Ore., Oregon City—City, City Hall, wa sys. imprvs. $400,000. A. B. Miller, engr.

Pa., Bethlehem—Bethlehem Water Au A. Wear, in charge, exten. c.i. waterma into Miller Heights Section; installing add facilities increasing water supply at Beth hem Silk Co. $20,000. R. L. Fox, c/o ow city engr.

Tex., Galveston—City, 30 in. waterma between Alta Loma and Galveston mainla $1,200,000. C. C. Washington, c/o Co house, engr.

Tex., Port Arthur — City, WW impr $80,000. J. B. Converse & Co., Port Arth engrs.

★**Tex., Wichita Falls** — City, plans [illegible] completed 104,500 lin. ft. 48 in. and 36 lin. ft. 54 in. enclosed gravity-flow cond lines from dam to city limits, $1,000,0 earthen, rein.-con., steel retention dam s spillway, municipal water supply. $2,500,0 A. J. Gates, c/o Waterworks Dpt., e CD 4/21—ENR 5/4.

B. C., Nelson—Municipality, watermain installation as per pitometer, $85,000; repl ing work out steel pipe, $70,000; intake at Anderson Creek, $3,500; pum station, Kootenay Lake distr. sys., $40,0 S. H. Dawson, City Hall, engr.

N. S., Sydney—Municipality, waterma extens. $30,000. M. F. Cossitt, City H engr.

Ont., Fort William—Municipality, wa mains, $100,000. H. M. Woodhouse, C Hall, engr.

Ont., Kenora—Municipality, exten. wa mains 1¼ mi. serving outlying district installing duplicate mains imprv. gra water distr. sys. $50,000. J. A. McCorm Town Hall, supt. and engr.

Ont., Paisley—City Council, survey to made immediately and report prepared W sys. and fire protection, $25,000-$30,000. G. Reid, Town Hall, engr.

Que., East Angus—Municipality, A. T igny, clk., water sys. $20,000. Dpt. P. Hea Civic Hospital, 1050 La Canardiere, Que City, engr.

READY FOR BIDS

B. C., Kelowna—Municipality, plans co pleted, ready for bids, replacing all w pipe with c.i. pipe in WW sys. $20,000. A. Blakesborough, P. O. Box 78, engr. 6/29—ENR 7/13.

BELMONT IRON WORKS

PHILADELPHIA ROYERSFORD EDDYSTON

Fabricators *Contractors*

Exporters

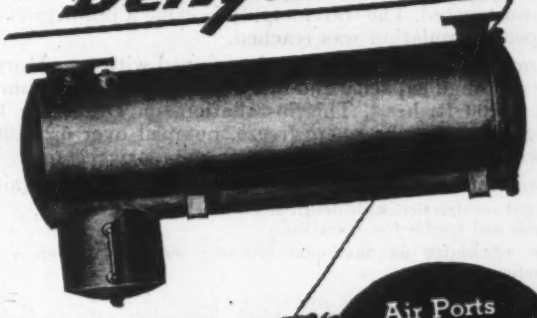
STRUCTURAL STEEL
BUILDING & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING
CHANNEL FLOOR

Main Office Philadelphia, Pa. — 44 Whitehall St. New York Office

HOW TO REMOVE 99 99/100 % of Entrained Water from Gasoline

THIS BOOKLET now on the press explains in complete detail the operation of the ERIE GASOLINE DEHYDRATOR. These units are available in three sizes: 100, 200 and 300 G. P. M. capacities with Electronic or Float Operated Water Inlet Valve safety controls. If you dispense gasoline from storage you will want to have a copy of this booklet.

ERIE
GASOLINE
Dehydrator



for
Air Ports
Cantonments
Industrial Uses
Marine Terminals
Fleet Terminals
Bulk Plants

ERIE FUELING SYSTEMS INCLUDE:

1. Gasoline Dehydrators
2. Turbine, Centrifugal and Rotary Type Gasoline Pumps
3. Airport Fueling Pits
4. Truck Fill Stands
5. Tank Car Unloading Assemblies
6. Lubricating Oil Tanks and Pumps
7. Portable Lubricating Systems for Aviation Oil
8. Gasoline Driven Pumping Units with Air Cooling and Mufflers
9. Valves and Fittings
10. Hose and Nozzles
11. Air Compressors
12. Air Meters

ERIE METER SYSTEMS, INC., *Erie, Pa.*

WRITE FOR YOUR COPY TODAY

ERIE

ERIE METER SYSTEMS, INC.

Main Office and Plant: Erie, Pa.

Water Needed for 6,000 New Homes!

One of the record-breaking Morris Pumps installed in the Wilmington Plant.

MORRIS PUMPS

Make a Record at Wilmington, N. C.

During the war boom the population of Wilmington, N. C., soared from 33,407 to over 100,000, and over 6,000 new housing units were constructed. The water supply became a problem even before the peak population was reached.

A new pumping plant was built and equipped with two Morris Pumps, one of 5-mgd capacity and one of 3-mgd capacity, pumping against a 200 ft. head. This installation, on December 16, 1943, during an unusually severe freeze, pumped over 6,200,000 gallons of water in 24 hours, to set a new pumpage record.

Proof again that when you install Morris Pumps you obtain:

1. Rugged construction with design stresses held low for smooth, reliable and trouble-free operation.
2. High efficiencies for maximum economy under continuous operation.
3. Quietness of operation.
4. Trim, workmanlike appearance which harmonizes with up-to-date plant design.

If you contemplate changes or additions to your water plant, ask for information now about Morris Pumps to fit your particular needs. More than three-quarters of a century of pump building experience stands behind every Morris Pump.

This new pumping plant is an important step in enabling Wilmington to compete with other southern cities for new industry.

MORRIS MACHINE WORKS Baldwinsville, N. Y.

Branch Offices in Principal Cities

MORRIS CENTRIFUGAL PUMPS

POSTWAR PROJECTS (Cont'd.)

SEWERS, WASTE DISPOS

PROPOSED WORK

Ill., Decatur—Decatur Park Dist., Dec... Club Bldg., sanitary sewage disposal p... for Faries Park. $28,000.

Ill., Decatur—Decatur Sanitary D... W. D. Hatfield, supt., Springfield Rd., Pri... 1, North Side interceptor sewer, $50... Priority 3, Brush College int. sanitary se... and pump. station, $150,000; Priority... Brush College lateral sanitary sewer ... of city limits, $100,000; Priority 4, Br... College lateral sanitary sewer east of ... Rd., $50,000; Priority 5, Brush College lat... sanitary sewer west of B.C. Rd., $50,... Priority 6, West Forest area int. sanit... sewer and pump. station, $40,000; Priorit... Northeast area sanitary sewer and pu... station, $75,000; Priority 8, W. Grand ... west of Fairview sanitary sewer, $80,... sewage disposal plant imprv.—link belt ... secondary settling tank, $50,000, all ... going outside city limits.

Mich., Ferndale—City, 21205 Woodw... Ave., Marshall East Trunk Sewer, $12... Eight Mile-Hilton Ave. Relief Sewer, $1... 000; Bermuda Ave. Relief Sewer, $50... J. F. Gibbs, Ferndale, city mgr.

N. H., Portsmouth—Municipality, C... Dale, mayor, 126 Daniels St., sewerage ... exten. $50,000.

N. Y., Rockville Center—Village, sani... sewers. $50,400. State Aid Planning Fu... allotted.

N. Y., Sodus—Village, sanitary sewer... sys. and treatment plant. $160,000; St... Aid Planning Funds allotted.

N. Y., Victor—Village, sanitary sewer... sys., disposal plant. $150,000. State ... Planning Funds allotted.

★**N. Y., Waverly**—Village, sanitary sew... age sys., sewage disposal plant, sa... sewers. $500,000. State Aid Planning Fu... allotted.

Okla., Durant—City, W. T. Overs... mayor, City Hall, sanitary sewers. $50...

Ore., Portland—City, incinerator. $137...

★**Pa., Allentown**—City, storm water se... Hamilton Park Trunk line and bra... sewers between South and Hamilton ... $80,000; College Heights Blvd. trunk ... Trexler Park to 25 and Washington ... and branch lines connecting into sa... $200,000; exten. 22 and Washington Sts. tr... line and branch lines connecting sa... $175,000; 3,250 lin. ft. 24 in. vitr. sewer ... $10 a ft., beginning at Juniata St. and Tr... Creek Rd., along Trout Creek Rd. to D... St. along Dixon St. and South Fifth ... along S. Fifth St. to Brookdale Ave., al... Brookdale Ave. to city limits, $82,500; 10... lin. ft. 24 in. vitr. sewer Whitehall T... collector to Distr. 19, connecting to Jor... Creek Trunk Sewer Sect. 2 at Bridge ... then along Jordan Creek northwest to Li... at Scherersville, $147,000; Alton Park Col... tor, 12,000 lin. ft. 18 in. vitr. sewer at ... per lin. ft., beginning at Trout Creek Tr... Sewer Sect. 2 at Trout Creek Rd. and Tr... Street southwest along Reading Railr... right of way to city limits, $72,000; Le... Lehigh Collector, 14,300 lin. ft. 24 in. s... sewer beginning at Little Lehigh Cr... Trunk Sewer Sect. 3 at Lawrence St. wes... Schreiber's Mill Bridge, then along Le... Lehigh Creek and Parkway Dr. to inter... tion of Devonshire Rd. and Parkway ... $143,000; Little Lehigh Creek Trunk Se... Sects. 3 and 4, 1,755 lin. ft. 30 in. conc... sewer $35,100, 2,530 lin. ft. 27 in. concr... sewer $45,540, 10,900 lin. ft. 24 in. vitr. se... $109,000, 1,800 lin. ft. 18 in. vitr. se... $10,800; Dist. 22 collector, 3,500 lin. ft. ... in. vitr. sewer $105,000, 6,000 lin. ft. 24 ... vitr. sewer $60,000, beginning at end ... Lehigh Trunk Sewer Sect. 2, to Brad... and Allen Sts., then to Lehigh River ne... ward to Kimmets Lock to Catasauqua ...

Hayward Buckets

Use this Class "E" Clam Shell Bucket fo... handling crushed stone, gravel, sand and oth... bulk materials.

THE HAYWARD CO., 48-50 Church St., N. Y...

BARCO

PORTABLE GASOLINE HAMMER

Why pay good wages, then slow down a man's output with inefficient tools? Barco Portable Gasoline Hammers were designed and perfected to enable good men to do more work... with less hardship on the worker. And Barcos have proved they pay a profit on hundreds of different jobs... saving time, speeding the work, keeping workers better satisfied. Rugged yet light and easily portable. Eleven special attachments. For full particulars, write to: The Barco Manufacturing Company, Not Inc., 1814 Winnemac Avenue, Chicago 40, Illinois.

BREAKING
DRILLING
DRIVING
TAMPING

In Canada: **The Holden Co., Ltd., Montreal**

The Free Enterprise System Is The Salvation of American Business

(VOTE FOR TWELVE)

☒ **NAYLOR** for high and low pressure air lines

☒ **NAYLOR** for high and low pressure water lines

☒ **NAYLOR** for ventilating pipe

☒ **NAYLOR** for cement pumping pipe

☒ **NAYLOR** for dredging pipe

☒ **NAYLOR** for hydraulic sluicing

☒ **NAYLOR** for de-watering and drainage

☒ **NAYLOR** for sand and gravel conveying lines

☒ **NAYLOR** for irrigation pipe

☒ **NAYLOR** for well point systems

☒ **NAYLOR** for composite piling

☒ **NAYLOR** for exhaust and intake

☒ *Vote For*

NAYLOR *LIGHT-WEIGHT* **PIPE**

. . . THE CONTRACTORS' CHOICE FOR THESE IMPORTANT PIPING JOBS

Sizes — 4" to 30" in diameter — thickness from 14 to 8 gauge. All types of fittings, connections and fabrication.

Naylor

NAYLOR PIPE COMPANY

General Offices: 1248 E. 92nd STREET, CHICAGO 19, ILL.

New York Office: 350 Madison Avenue, New York 17, New York

POSTWAR PROJECTS (Cont'd.)

then south to Railroad underpass; Le... River Trunk Sewer Sect. 3D, 3,000 lin. ... 24 in. vitr. sewer $90,000, 725 lin. ft. ... in. vitr. sewer $4,250, beginning at Pigeon ... and Washington Sts., east to Quincy St., ... Cambridge, Quill, Cedar and Wabash ... impry. sewage treatment plant, ad... pump. equip., sludge bed inclosures ... sludge digestors, $250,000; pump. sta... and force main for Dist. 23A at Club ... and Lehigh and New England Railroad ... derpass, $25,000; flood protection ar... dyke at sewage treatment plant, $100,... storm water sewers—trunk line west ... Ott St. from Cedar St., southward to ... St. and west in Hamilton Blvd. to ... line, $110,000; trunk line along Trout C... in 19th Ward East city line west ... about 6,000 ft., $350,000; relief storm w... sewer Sumner Ave. 6 to 18 Sts., $100,... branch and lateral lines in area bet... Filbert and Maxwell Sts., East Hamil... and South Sts., $50,000; trunk line f... Kimmets Lock at Lehigh River and Dau... St. eastward to Sherman St. and bra... lines connecting same between Union B... and north to city line, $275,000; branch ... lateral lines in 19 Ward from S. Ar... St. to S. Law St., and between Trout C... trunk line and city limits, $35,000; t... line north of Clader's Div., in line of ... Green St., Lehigh River to Fernwich ... $75,000; branch and lateral sewers in ... between Sherman St. and Club Ave., ... of Union Blvd. to city line, $75,000.

Pa., York—City, c/o City Council... storm water sewers. $25,000. Financ... not yet provided for.

R. I., Bristol—Town, H. F. Hill, chm. ... War Com., Bristol, storm and sani... sewers, various streets. $50,000-$100,000

Tex., Amarillo—City, sanitary sewers ... sys. imprvs. $100,000.

Tex., Highland Park — City, sew... $100,000.

Wash., Bremerton—City, City Hall, sa... in Capitol Hill Dist. $50,000; outfall ... Cambrian Ave. $45,000.

N. S., Kentville—Municipality, c/o A. ... Macdonald, clk., sewer construction. $2...

Ont., Atikokan—Municipality, sewe... sys. $60,000.

Ont., Brantford—Municipality, c/o M... J. P. Ryan, storm and sanitary sew... $100,000; sewage treatment plant, $60... incinerator, $50,000.

Que., Rimouski—Municipality, c/o P... Gagnon, mayor, City Hall, sewerage ... extens. $80,000.

Sask., Kinderaley—Municipality, c/o I... Kincaid, clk., sewerage sys. dependent ... whether water supply can be increased

PLANS UNDER WAY

Ia., Clinton—City, A. J. Lerche, clk. ... Hall, sanitary sewers. $25,000. R. B. ... derson, city engr.

Ia., Jefferson—City, H. D. Hart... mayor, City Hall, storm sewers, $75... sanitary sewers, $175,000. K. R. Bo... Valley Bank Bldg., Des Moines, con... engr.

Ia., Waterloo—City, R. B. Shipley, ... City Hall, sewage disposal plant. $1,... E. E. Schenk, Waterloo Bldg., consult. ... CD 6/9/43—ENR 6/17/43.

Kan., Abilene—City, T. Nusz, mayor, ... Hall, sanitary sewers. $45,000. W. F. A... son, city engr.

Mich., Ecorse—City, 4373 High St., ... liminary plans underway, Rockwood ... Sewer Arms, exten. to present sys., $9... Westfield Ave. Sewer, $58,000. L. R. ... 4373 High St., city engr.

Mich., Ecorse—City, 4373 High St., ... liminary plans underway High St. ... Sewer. $190,000. L. R. Gare, 4373 ... St., city engr.

LEWIS & McDOWELL In...

Engineers & Contractors

GUNITE work in all its Branches

Prestressed Gunite Tanks

Waterproofing, all types

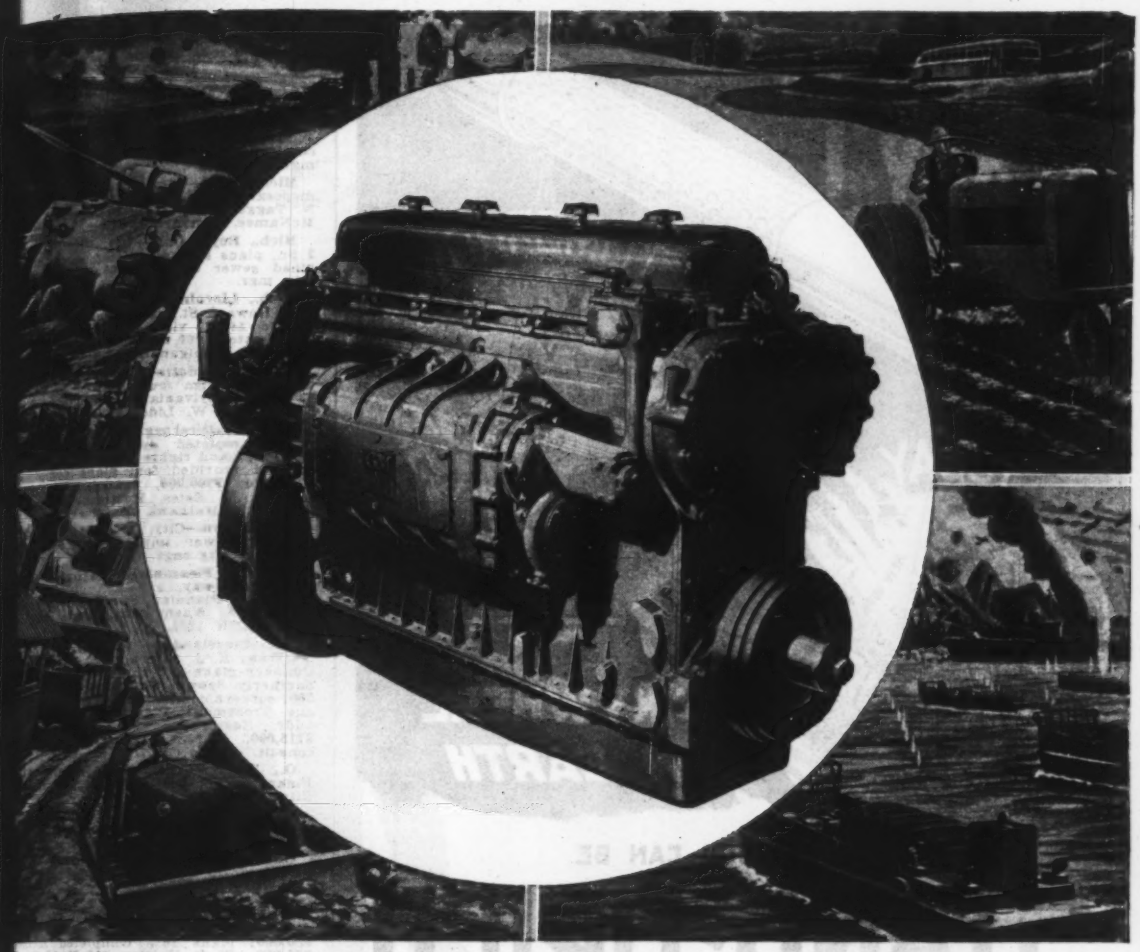
Restoration of Masonry Buildings

Synthetic Rubber and other special... Tank Linings

Dam Repairs and Reconstruction

205 Madison Avenue, New York 1...

Murray Hill 3-8554



GM DIESELS SERVE WHEREVER AMERICA NEEDS POWER

America's fighting Engineers and Seabees really work miracles. Sand dunes are leveled. Jungles are cleared. Landing strips appear overnight. Staggering loads are moved over land and sea.

Helping them work these miracles are General Motors Diesel engines.

Because these engines are rugged and dependable, they get the toughest kinds of jobs to do.

Because they take so little fuel, they save precious transport space.

Because they have been designed for simplest maintenance, they stay on the job and keep on the go.

War is a tough proving ground for engines. It shows their mettle, reveals their stamina. As they perform their wartime tasks, these GM Diesels are proving the service they will continue to render in the many civilian needs for dependable, economical power after the war.

Army-Navy "E" for efficiency at production flies proudly the GM Diesel plant in Detroit.

P AMERICA STRONG
BUY WAR BONDS

GM
GENERAL MOTORS
DIESEL POWER

ENGINES 15 to 250 H.P. DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.

ENGINES 150 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio

LOCOMOTIVES ELECTRO-MOTIVE DIVISION, La Grange, Ill.

THE JOB CAN BE

STANG-DRIED

Fast -at low cost -for less labor -and best results

STANGDRIED jobs scattered all over the Western Hemisphere forecast tomorrow's WORLDWIDE strategic locations of STANG Equipment and STANG Experts, ready to solve the worst problem of unwatering saturated soil, anywhere IN earth ON earth.

"For a STANGDRIED job is a low cost job,
insuring dry firm land
From northern bogs and marshes
to India's sodden strand."

JOHN W. STANG CORP.

TWO BROADWAY • NEW YORK 4 • N. Y.

HOUSTON, TEXAS PORTLAND, ORE. LOS ANGELES, CAL.

POSTWAR PROJECTS (Cont'd.)

Mich., Grosse Pointe Farms—Village, Kirby Rd., plans underway interc sewer in Grosse Point Blvd. and Kirby $46,000; 5,000 lin. ft. combined lateral exten. $35,000. M. M. Smith, village eng

Mich., Grosse Pointe Park—Village, 1 Jefferson Ave., Zone 2, plans compl sanitary sewer. $350,000. E. B. Lane, vil mgr.

Mich., Niles—City plans underway sew disposal plant, 2 sludge tanks. $100,000 N. Taggett, city engr. Schoecraft, Dru McNamee, Ann Arbor, Mich., consult. e

Mich., Royal Oak—City, City Hall, 22 3 St., plans 50% completed storm and c bined sewer exten. $208,000. E. Sha city mgr.

Mich., Lincoln Park—City, P. Wks. B 1612 Howard St., plans underway 34,36 12- to 54-in. vitr. and concrete sani sewer extens., 60 manholes. $434,375. E Pate, 532 Michigan Blvd., Detroit, city e

Mich., Wyandotte—City, 26,630 lin. ft. s tary and storm trunk sewer in Grove 13 St., Pennsylvania Ave. and Fort St. a $70,500. F. W. Liddle, city engr.

Miss., Hattiesburg — City, prelimi plans completed sewage treatment w $400,000, Land rights not cleared and fin ing not provided for; plans completed cinerator, $400,000, financing not prov for. J. R. Estes, Hattiesburg, city e Landry & Mathews, Hattiesburg, archi

Mo., Joplin—City, Maude E. Jonas, sanitary sewer imprvs. $50,000. H. Johnston, city engr.

N. Y., Pleasantville—Village, sani sewer in Bway. and Church St. $3 State Aid Planning Funds allotted. G. Smith, 15 Washington Ave., engr. 11/24—ENR 12/2.

★**O., Cleveland** — Sewage Div., Dpt. Wks., E. J. Crown, dir., City Hall, liminary plans and surveys completed Southerly Sewage Treatment Plant, $2 500; surveys completed addns. Westerly age Treatment Plant, $1,584,000; sur addn. Easterly Sewage Treatment Pl $115,000. Havens & Emerson, Leader Bl consult. engrs. CD 7/15/43—ENR 7/22/

O., Warren—City, incinerator. $12 Financing not provided for. W. S. Har City Bldg., city engr.

Okla., Chickasha—City, outfall sani sewer, $100,000. S. Grimm, City Hall, Financing not yet provided.

Okla., Heidenville—City, plans 10% c pleted storm sewers, $200,000. C. H. R City Hall, engr.

Okla., Shawnee—City, T. E. Thomp mgr., City Hall, plans 25% completed sew disposal plant, $25,000; sanitary sew $50,000; plans 10% completed incinera $75,000. W. R. Holway, 302 E. 18 St., Ta consult. engr.

Ore., Oregon City—City, City Hall, pl sewage disposal plant $216,000. CD 4/ ENR 7/13; sewers $50,000; garbage dis plant $75,000. A. E. Miller, city engr.

Pa., Allentown—City Comrs., storm w sewers-lateral lines between N. 13 and Sts. and between Sumner Ave. and H land St., $40,000; branch and lateral lin 12th Ward between S. 10 St. and Le Parkway East and Wyoming St. and L Lehigh Creek together with trunk line, tle Lehigh Creek to Jefferson and Wyo Sts., $50,000. Russell Van Nest Black, Pennsylvania Planning Bd., Mt. Joy, con engr. E. J. Meckley, City Hall, city e

Pa., Lancaster—City Comrs., repla combination sewers, $137,270; replacing and 42 in. brick sewers in Andrew St. Mill to North Sts. and North St. from drew to Rockland Sts., $58,000; storm se in President Ave., Race and State $75,000; brick manholes on present se $26,000. Financing not provided for. Shertzer, city engr.

"GUNITE"

New Construction—Repair

Prestressed Tanks	Steel Encasem
Reservoir Lining	Dam Repairs
Pen Stock Lining	Tunnel Lining
Smoke Stack Lining	Sewer Repairs

Disintegrated Concrete Abutments Reser

Repairs To All Types of Masonary

Write for our Bulletins

PRESSURE CONCRETE CO.

Engineers & Gunite Contractors

15t Nat. Bank Bldg. FLORENCE, ALA.

6 Avenue NEWARK, N.

practical, modern, beautiful, but... WILL IT RUST?"

Certainly steel is the practical, modern, economical material for sashes. Its great advantage lies in its permanency—an advantage it has only when properly protected against rust.

Hot Dip Galvanizing provides the perfect and inseparable fusion of the heaviest possible zinc coating to iron and steel products, and protects by sacrificial action. Laboratory and field tests both prove that this method is the best and more economical rust preventive.

If you want to be sure of the permanent beauty or usefulness of the iron or steel articles you buy, be sure to specify "Hot Dip Galvanizing." If you make articles of iron or steel, be sure of getting a genuine and expert job of Hot Dip Galvanizing by sending your materials to one of the members listed at the right. American Hot Dip Galvanizers Association, Inc., First National Bank Bldg., Pittsburgh 22, Pa.

"If it carries this seal it's a job well done."

Buy from the qualified members listed below and KNOW you are getting a genuine HOT-DIP job.

CALIFORNIA
LOS ANGELES GALVANIZING CO., HUNTINGTON PARK
ATLAS GALVANIZING, INC., LOS ANGELES
EMSCO DERRICK & EQUIPMENT CO., LOS ANGELES
JOSLYN CO. OF CALIFORNIA, LOS ANGELES
WESTERN GALVANIZING COMPANY, LOS ANGELES
HUBBARD & CO., OAKLAND
JOHN FINN METAL WORKS, SAN FRANCISCO
SAN FRANCISCO GALVANIZING WORKS, SAN FRANCISCO
SUPERIOR PACIFIC GALVANIZING CO., LOS ANGELES
RHEEM MANUFACTURING CO., RICHMOND
INTERNATIONAL DERRICK & EQUIPMENT CO., TORRANCE

CONNECTICUT
WILCOX, CRITTENDEN & COMPANY, INC., MIDDLETOWN

GEORGIA
ATLANTIC STEEL CO., ATLANTA

ILLINOIS
EQUIPMENT STEEL PRODUCTS DIVISION OF UNION ASBESTOS AND RUBBER CO., BLUE ISLAND
JOSLYN MFG. & SUPPLY CO., CHICAGO
STANDARD GALVANIZING CO., CHICAGO

MAINE
THE THOMAS LAUGHLIN CO., PORTLAND

MARYLAND
SOUTHERN GALVANIZING COMPANY, BALTIMORE

MICHIGAN
RIVERSIDE FOUNDRY & GALVANIZING CO., KALAMAZOO

MINNESOTA
LEWIS BOLT & NUT CO., MINNEAPOLIS

MISSOURI
COLUMBIAN STEEL TANK CO., KANSAS CITY
MISSOURI ROLLING MILL CORP., ST. LOUIS

NEW JERSEY
DIAMOND EXPANSION BOLT CO., INC., GARWOOD
L. O. KOVEN & BROTHER, INC., JERSEY CITY
INDEPENDENT GALVANIZING COMPANY, NEWARK

NEW YORK
ACME STEEL & MALLEABLE IRON WORKS, BUFFALO
THOMAS GREGORY GALVANIZING WORKS, MASPETH, (N. Y. C.)
ATLANTIC STAMPING CO., ROCHESTER

OHIO
THE WITT CORNICE COMPANY, CINCINNATI
THE FANNER MFG. CO., CLEVELAND
THE NATIONAL TELEPHONE SUPPLY CO., CLEVELAND
INTERNATIONAL-STACEY CORP., COLUMBUS
THE NEWARK GALVANIZING CO., NEWARK
COMMERCIAL METALS TREATING, INC., TOLEDO

OREGON
GALVANIZERS, PORTLAND

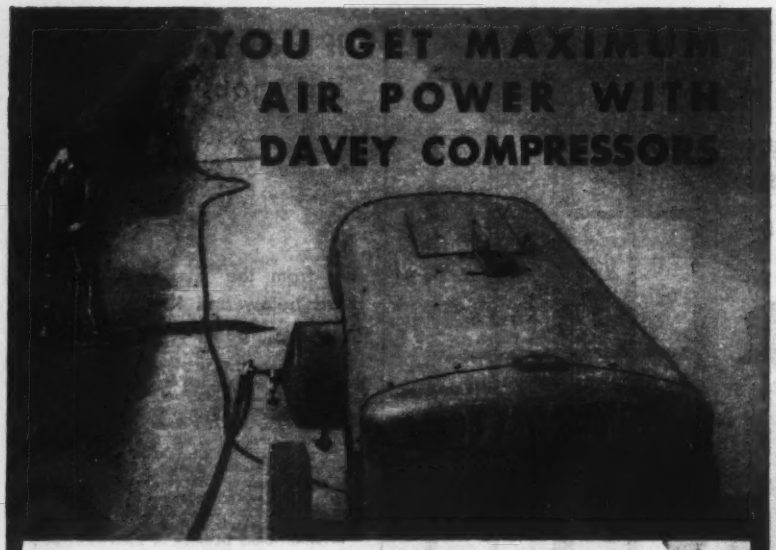
PENNSYLVANIA
LEHIGH STRUCTURAL STEEL CO., ALLENTOWN
AMERICAN TINNING & GALVANIZING CO., ERIE
PENN GALVANIZING CO., PHILADELPHIA
HANLON-GREGORY GALVANIZING CO., PITTSBURGH
OLIVER IRON & STEEL CORPORATION, PITTSBURGH

RHODE ISLAND
JAMES HILL MFG. CO., PROVIDENCE

WASHINGTON
ISAACSON IRON WORKS, SEATTLE

WISCONSIN
ACME GALVANIZING, INC., MILWAUKEE

Not just Galvanizing but **hot-dip GALVANIZING**



RUGGED AND DEPENDABLE FOR LONGER LIFE

Davey Compressors are built to serve and endure, to perform faithfully for many years with a minimum of attention. The performance records of Davey on the battle fronts and on huge war projects are proof that they are tough and dependable.

DAVEY ENGINEERED—Air-cooled design, electrically-welded frames, aluminum-alloy heads, individual cylinders and conservative speeds . . . give you . . .

LOWER MAINTENANCE—No water-jacket trouble, rapid heat dissipation, greater cooling and lower operating costs.

ONLY DAVEY OFFERS GUARANTEED LIFETIME VALVES

Davey Compressors available in 60, 105, 160, 210 and 315 cfm capacities at 100 lbs. pressure. Direct or V-belt driven, gasoline or Diesel powered. Two or four steel wheels, or pneumatic tired. Davey also manufactures a full line of Industrial Compressors, Heavy Duty Truck Power Take-Offs and Pneumatic Saws.

DAVEY *Compressor Co.*
KENT · OHIO
DEALERS IN PRINCIPAL CITIES
ARMY E NAVY

DRILLING CONTRACTORS

DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

Foundation Testing for Bridges, Dams and All Heavy Structures

Also

Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

It's easier to lift, lower, push or pull the Simplex Way!

Simplex SLEVER SCREW HYDRAULIC **Jacks**

for every construction purpose
Awarded the Gold Medal for Safety
Ask for Catalog 44
Templeton, Kenly & Co., Chicago 44, Ill.

POSTWAR PROJECTS (Cont'd.)

Pa., Lancaster—City Comrs., plans [illegible] completed addnl. digestor and sludge storage tanks, North and South Plants, $175,000; cover present drying beds, $72,000. J. J. Shertzer, city engr.

Tex., Port Arthur—City sanitary sewers, $110,000. J. B. Converse & Co., Port Arthur, engrs.

★**Tex., San Antonio**—City G. Mauermann, mayor, plans underway outfall and auxiliaries, concrete siphon under river, sanitary sewer lines in 3 districts, $1,694,000; 17 storm sewer lines, $925,000; storm sewer facilities north of San Pedro Park, $290,000; sewage treatment plant addns., $250,000; sanitary sewer outfall lines along Salado Creek, across San Antonio river, to connect with treatment plant, $30,000; Mitchell Lake Disposal sys., to exceed $25,000. Bonds to be voted. T. Cogshill, City Hall, city engr. H. R. F. Helland, Frost Bldg., consulting engr. CD 4/30, 5/25 and 9/23/43—ENR 5/27, and 9/30/43.

B. C., Nelson—Municipality, sewerage sys., Lot 182, $25,000; Lot 96, $20,000. S. S. Dawson, City Hall, engr.

N. S., Sydney—Municipality, sewer main extens. $35,000. M. F. Cossitt, City Hall, engr.

Ont., Kenora—Municipality, sewer extens. serving outlying dist. $50,000. J. A. M. Combs, Town Hall, supt. and engr.

Ont., Milton—Halton Co., sewerage sys., $45,000. G. Power, c/o owner, engr.

Ont., Stratford—Municipality, W. J. Storey, clk., storm sewer exten., sewage disposal plant, $150,000. W. H. Riehe, city engr. CD 11/9/43—11/11/43.

Ont., Sudbury—Municipality, sewage pump. station, $50,100. R. H. Martindale, City Hall, engr.

Que., East Angus—Municipality, c/o A. Tourigny, clk., sewerage sys. $30,000. Dept. P. Health, Quebec City, engr.

Que., Quebec City—Municipality, F. X. Chouinard, city clk., pump. station, corner of Rausseau and Commissioners Sts., Quebec West., $40,000; sewerage pump. station, corner 13 St. and 4 Ave., in Limoilou, $40,000. E. Hamel, City Hall, engr.

READY FOR BIDS

★**Ont., Chatham**—Municipality, plans completed storm and sanitary sewer sys. exten., and disposal plant, $500,000. T. M. [illegible] Kingston, Town Hall, engr.

Ont., St. Thomas—Municipality, plans completed sanitary and storm sewers, $100,000. W. C. Miller, City Hall, engr.

BRIDGES

PROPOSED WORK

Mass., Granby—Town, E. M. Ingham, chm. Post War Com., concrete bridge over Batchelor Brook, Amherst St., North End, $25,000.

Mass., Medford—City, W. Lawrence, mayor, City Hall, reconstructing bridges at Grove and Harvard Sts., culvert at Railroad Bridge. To exceed $25,000.

★**Mich., Royal Oak**—City, City Hall, plans grade separation hy. underpass under railroad tracks. $2,000,000. E. Shafter, 2[illegible] E. Third St., city mgr.

New Hampshire—State Hy. Dpt., State House, rein.-con. rigid hy. bridge, at Keene, $100,000; bridge and approaches at Rochester, $63,800; rein.-con. bridge, surface treated gravel approaches, Warren, $56,000; surface treated gravel rein.-con. bridge and approaches, Stratford, $165,000.

Alta., Calgary—Municipality, bridge across Canadian Pacific R. R. right of way at 5 St. W. $100,000.

B. C., New Westminster—City, mayor W. Mott, construct Lulu Island bridge, $125,000.

TO INVENTORS TO MANUFACTURERS

Inventors: Have you patents for disposal here or abroad?

Manufacturers: Are you seeking important new products or processes for present or future exploitation?

W. B. KAHN CO.
International Patent Brokers • Est. 1904
551 FIFTH AVE., N. Y.

Solving Problems on the Delaware Aqueduct

Headframe — Delaware Aqueduct job

Lidgerwood hoist employed in construction of Delaware Aqueduct

LDING the longest tunnel of all time posed ome tough problems for engineers. On the e route of the aqueduct, running 300 to 2,000 low the surface from the west slope of the lls to New York City, fault zones and areas rous rock were encountered — mud was into the tunnel in 1,000 yard lots, under pressure up to 290 lbs. per square inch. l grouting was called for; in some cases, ive bulkheads as well. And, of course, all terials to meet these problems had to be through shafts.

a compliment to the engineers, and a tribute reliability of the hoisting equipment, that situations were overcome *without* delaying eduled progress of the aqueduct. On sev- the contracts, Lidgerwood hoists were used to operate the shafts — Lidgerwood-modified or overhauled equipment was used on various other portions of the project. As engineers and contractors have come to expect, the Lidgerwood hoists performed their vital function day-in and day-out, without causing expensive tie-ups.

Lidgerwood hoists have a 70-year record of dependable, efficient operation in mine, quarry and construction service. Built to *fit the job*, there's a Lidgerwood steam, electric, gasoline or Diesel hoist to meet every construction requirement.

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS - ELIZABETH, NEW JERSEY

IT'S THE SURE HARD-HITTING Blows THAT COUNT

SUPER-VULCAN OPEN TYPE DIFFERENTIAL-ACTING PILE HAMMERS 18C, 30C, 50C and 80C

You can put the most extensive pile driving jobs up to the Super-VULCAN and have the assurance that you'll get results that count in getting the pile in on schedule.

You get speed—there's twice the usual blows per minute and you have tops in hitting power so that the piles go down faster. You save 25 to 35 per cent of the usual steam requirements.

The open type fits the same leads and uses the same accessories as the well known widely used WARRINGTON VULCAN Single-Acting Pile Hammers.

Sizes 18C—30C—50C—80C meet all needs

VULCAN IRON WORKS Since 1852

331 North Bell Avenue

Chicago 12 ---Illinois

POSTWAR PROJECTS (Cont'd.)

Ont., Stratford — Municipality, replacing bridges. $100,000. W. H. Rieha, city mgr.

P. E. I., Charlottetown—Province, Charlottetown, bridges across North and Western Rivers. $200,000. Ministry of P. Wks. & Hys., Charlottetown, engrs.

PLANS UNDER WAY

Ill., Danville—City, City Hall, rein.-con. girder bridge, $40,000. F. Roseman, City Hall, city engr.

Ill., Danville—Vermilion Co., County Bldg., steel, I-Beam bridge, concrete floor and abutments, S.A. Route 11, Sect. L-5-15d, between 119 and Armstrong, $45,000; 30 and 56 ft. bridges, S.A. Route 8, Sect. 49 B-M.F.T., Fairmount West to Co. line, $38,000; 22, 26 and 30 ft. bridges, etc., S.A. Route 8, Sect. 48 B-M.F.T., Catlin West of Fairmount, $35,000; 50, 34 and 28 ft. bridges, all steel, I-Beam, concrete floor and abutments, S.A. Route 23, Sect. 47 B-M.F.T., east of Georgetown, $42,000; plans 50% completed steel, I-Beam, concrete bridge, S.A. Route 20, Sect. 36-B, Lake Rd., $55,000; plans 25% completed 150 ft. bridge and two 26 ft. approach spans, steel, I-Beam, concrete floor and abutments, S.A. Rt. 14, XB-M.F.T., west of Rossville, $30,000; plans 20% completed 150 ft. bridge and two 26 ft. approach spans, steel, I-Beam, concrete floor and abutments, $55,000. W. C. Dye, co. supt. hys.

Mich., Lincoln Park—City, 1612 Howard St., plans underway 3 pedestrian underpasses under hys. $30,260. E. H. Pate, 1612 Howard St., engr.

Mich., Royal Oak—City, plans underway concrete pedestrian underpass, under hy. $50,000. Ed. Shafter, 221 E. Third St., city mgr.

Ore., Oregon City—City, City Hall, grade crossing elimination at Singer Hill. $50,000. A. E. Miller, city engr.

★**Pa., Allentown**—City Comrs., bridge, 7 and Union Sts. to 5 and Auburn Sts., $2,250,000; South 4 St. Viaduct $1,000,000; bridge over Lehigh River at South Carlisle St., 16 Ward $1,500,000; bridge over Jordon Creek, Ridge Ave. and Bridge St., $750,000; bridge over Little Lehigh Creek, 16 and Lawrence Sts., 12 Ward, $750,000; bridge over Reading R.R. tracks, S. 5 St., near Susquehanna St. $500,000; bridge over Cedar Creek, St. Elmo and Fairview Sts. $25,000; bridge over Cedar Creek, Ott St. $25,000; bridge over Cedar Creek, South St. and East Texas Blvd. $50,000. Financing not provided for. E. J. Meckley, city engr. R. Van Nest Black, Mount Joy, consult engr.

Pa., Allentown—City, c/o City Comrs., widening bridges at S. 10 St., over Little Lehigh Creek and at Union St. at Elmo St., over Cedar Creek, $25,000. Russell Van Nest Black, c/o Pennsylvania Planning Bd., Mt. Joy, consult. engr. E. J. Meckley, City Hall, city engr.

Rhode Island—State Dpt. Hys. & Bridges, Providence, rigid frame hy. Bridge 403, Kingston Rd., over $25,000, Fay, Spofford & Thorndike, 11 Beacon St., Boston, Mass., consult. engrs.; concrete hy. Bridge 402, Nooseneck Hill Rd., over $25,000, J. H. Worcester & Co., 79 Milk St., Boston, Mass., consult. engrs.

B. C., Nelson—Municipality, North Shore Bridge construction. $400,000. S. H. Dawson, City Hall, engr.

B. C., New Westminster—Municipality, bridge via Poplar Island, $125,000. A. Hunter, City Hall, works supt. and engr.

★**Nova Scotia**—Dominion Govt., Ottawa, Ont., bridge connecting Cape Breton Island with Nova Scotia mainland, $44,000,000, or causeway, $36,000,000. Dpt. P. Wks., Ottawa, Ont., engr.

Ont., Fort William—Municipality, bridge construction. $300,000. H. M. Woodhouse, City Hall, engr.

Ont., Picton—Prince Edward Co., Picton, bridge construction. $150,000. J. B. Dunkley Co. Bldg., engr.

Ont., St. Jacob—Province of Ontario, Toronto, bridge. $30,000. Dpt. Hys., Toronto, engrs.

Ont., Walkerton—Bruce Co., Walkerton, bridge. $100,000. G. E. Stephenson, Box 398, engr.

Ont., Welland—Welland Co., bridge construction. $60,000. J. R. Scott, County Bldg., engr.

Que., Arvida—Municipality, subway eliminating railroad crossing. $75,000. R. A. Lemieux, City Hall, in association with engineers of Canadian National R.R., H. A. Dixon, ch. engr., 360 McGill St., Montreal, engrs.

Que., Mansonville—Municipality of Potton, c/o R. E. Cowan, secy., Mansonville, bridge construction. $50,000. Dpt. P. Wks., Quebec City, engr.

READY FOR BIDS

N. Y., Bainbridge and Unadilla—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing reconstruction for Delaware & Hudson R. R. Corp., P. O. Ferris, ch. engr., foot of State St., Albany. $250,000. CD 12/20—ENR 1/13.

N. Y., Buffalo—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Dingens St., Case 3452, for Lehigh Valley R. R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem, Pa., $345,594. CD 12/15—ENR 1/13.

Keep ahead of Schedul with GATKE High-Heat-Resistin

Asbestos BRAKE MATERIA

How do GATKE Brake M als speed operations and money? They keep oper and avoid delays. They ju and release with smooth, true, non-grabbing actio faster operation—require adjustments.

GATKE Brake Materials a gineered and service prov every brake and clutch o vating, Road Building and struction Equipment. Jus us what you need!

GATKE Brake Blocks and Frictions

Disc Type Clutch Facings

Cone Type Clutch Facings

GATKE MATE Brake Lining Clutch Facing Frictions Non-Metallic Bearings Sheet Packing

GATKE CORPORATIO

236 N. LA SALLE ST. CHICAG

What's "Eatin Your Water Tank

The answer is rust—the cure is RUSTOP.

Steel tanks rust from the inside out—and fast. Apply RUSTOP the only known *sure method* of corrosion prevention to all submerged areas.

INSTALL RUSTOP NO CHEMICALS USED

Rustop is a cathodic, or electrical method that *removes old rust* on submerged areas and *prevents new rust* from forming.

No longer necessary to sandblast, scrape or paint. Cuts down tank repairs and maintenance—extends its life. Installation without interruption to service. Permanent protection at small cost. Operation only a few cents a month. Guaranteed.

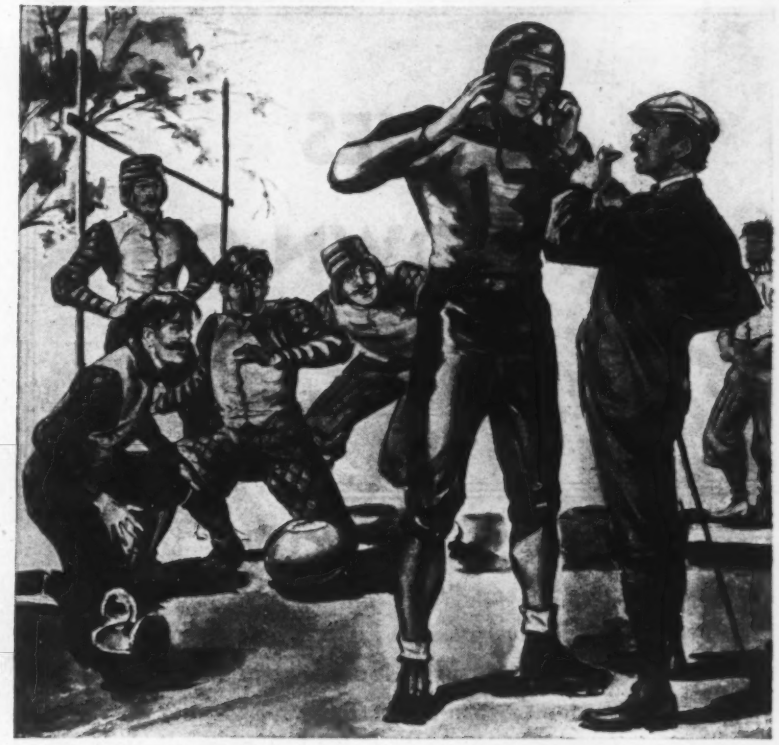
Largest cities and industrial firms use RUSTOP. Act. Save that tank.

Cathodic protection approved by Associated Factory Mutual Laboratories—by War Department (Chief Engineers' Office)—by American Water Works Assn.

ELECTRO RUST-PROOFING CORP.

Dayton 10, Ohio, U.S.A.

There's been a big change



Football is still a matter of touchdowns—but me has developed a more skillful game with any technical improvements.

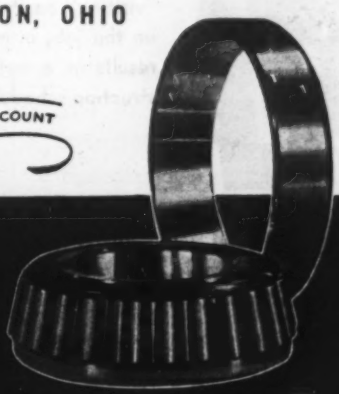
The duties of a tapered roller bearing are the me, too. Tyson, however, has introduced the *ll-Rolls* design which has vastly increased its ficiency.

With the addition of *thirty percent more rolls*, Tyson has almost doubled ordinary roller bearing life. Size for size, the Tyson "All-Rolls" bearing has greater load capacity—more strength and rigidity. It's a heavy-duty bearing for heavy-duty jobs.

The big name in bearings today is . . . **TYSON!**

TYSON BEARING CORPORATION · MASSILLON, OHIO

COUNT THE ROLLS · THE ROLLS COUNT



Tyson

TODAY'S HEAVY-DUTY BEARING

★ **KEEP ON BUYING WAR BONDS** ★

DIXIES CUT DOWN ON "Time out"

Sick absenteeism and "time out" take a sudden drop, when crisp individual paper cups come on the job. The old water bucket and its tin dipper are outlawed. Dixie's Portable Water Carrier brings the water to the men at their work, serving them in individual Dixie or Vortex paper cups.

Colds and other illnesses that cause much of the avoidable absenteeism are blocked at their source. Used by one person only, these health protecting cups break the chain of mouth-to-mouth contagion.

Less "Gabbing"

By eliminating trips to the water wagon, this portable water service cuts down "visiting" on the job. Yes, it keeps men on the job, in more ways than one . . . results in a noticeable step-up in construction schedules.

Write for descriptive folder giving complete information on this portable water service, including tanks, dispensers and cups.

Dixie and Vortex Cups are made at Easton, Pa., Chicago, Ill., Darlington, S. C. and Toronto, Canada.

DIXIE CUPS

DRINKING CUPS AND FOOD CONTAINERS

POSTWAR PROJECTS (Cont'd.)

N. Y., Dobbs Ferry—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Ashford Ave., Case No. 5970, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York. $448,255. CD 12/15—ENR 1/13.

N. Y., East Chatham and Queechy Lake—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing reconstruction, for Baltimore & Ohio R. R. Sys., A. C. Clarke, ch. engr., Baltimore and Charles Sts., Baltimore, Md. $230,000. CD 12/20—ENR 1/13.

★**N. Y., East Rochester**—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Washington St., Case 6014, for New York Central Sys., S. E. Armstrong, ch. engr., 466 Lexington Ave., New York. $503,100. CD 12/15—ENR 12/23.

N. Y., Endicott—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing reconstruction at McKinley Ave., for Erie R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O. $325,000. CD 12/20—ENR 1/13.

N. Y., Farmingdale—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Massapequa Rd., Case No. 5442; Farmingdale Rd., Case No. 5979; Heisser Lane, Case 6016, for Long Island R. R. Co., C. E. Adams, ch. engr., Penn. Sta., New York, $396,900. CD 12/15—ENR 1/13.

N. Y., Fassett and Southport—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing reconstruction for Pennsylvania R. R., J. L. Gressit, ch. engr., Broad St. Station, Phila., Pa. $280,000. CD 12/20—ENR 1/13.

N. Y., Hastings—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Jackson Ave., Case No. 4993, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, $310,000. CD 12/15—ENR 12/23.

N. Y., Haverstraw—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at New Main St. and West Side Ave., Case No. 6422, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York. $402,155. CD 12/15—ENR 1/13.

N. Y., Hawthorne—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Bway, and at Cross St., Case No. 5969, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York. $408,700. CD 12/15—ENR 1/13.

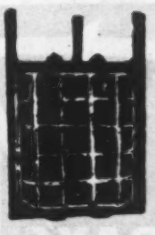
★**N. Y., Hempstead**—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing eliminations at Wantagh Ave., Case 4670; Beach St., Case 7829; Oakland Ave., Case 10189, for Long Island R. R. Co., C. E. Adams, ch. engr., Penn. Sta., New York, $835,800. CD 12/15—ENR 12/23.

★**N. Y., Kingston**—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Bway, Case No. 4781, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York. $614,000. CD 12/15—ENR 12/23.

★**N. Y., Lancaster**—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Central Ave., Case 5925 for New York Central Sys., S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, Delaware, Lackawanna & Western R. R. Co., G. A. Phillips, ch. engr., Passenger Terminal, Hoboken, N. J., Lehigh Valley R. R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Bethlehem, Pa., and Erie R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., $950,000. CD 12/15—ENR 12/23.

N. Y., Lockport—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Lock St. and Gooding St., Case No. 7283, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, $264,300. CD 12/15—ENR 12/23.

RODNEY HUNT



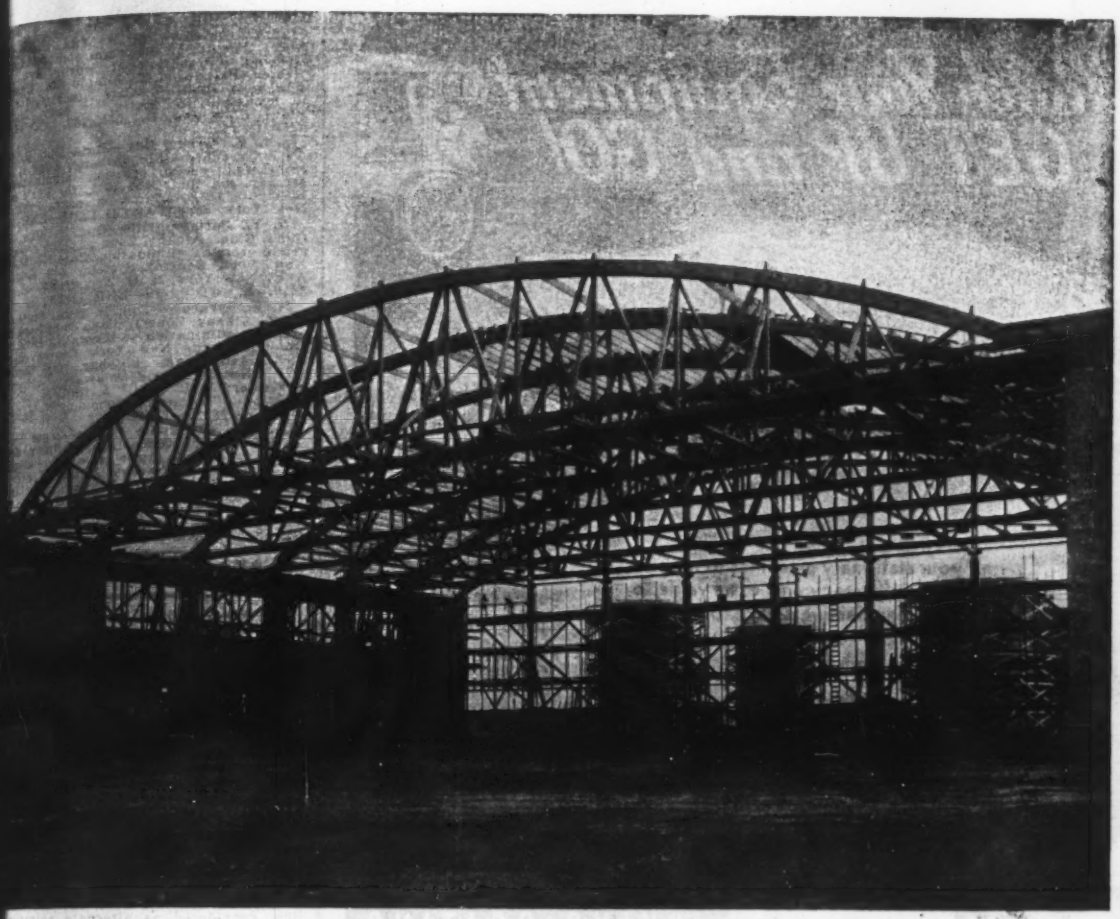
SLUICE GATES

Also flap and mud valves, shear and filler gates. Dependable equipment since 1840.

Write for Special Catalog Today

RODNEY HUNT MACHINE CO.

79 Lake St., Orange, Mass., U.S.A.



160 foot Bowstring Trusses with glued laminated top chords; bracing, end wall framing and door guides fabricated and erected by Timber Structures, Inc., for an army hangar.

ORGANIZATION IS IMPORTANT

...BUILD WITH TIMBER STRUCTURES

business is the prefabrication
ber trusses, columns, arches,
s and other heavy items. Be-
Timber Structures engineering,
acturing, shipping and erection
is highly organized, we have
rivileged to work closely with
al industries, governmental
s and the armed services in
ncy, permanent construction
y kinds. For example:

nufacturing plants for the pro-
tion of vital military and
ntial needs.

2. Bridges for the Pan-American and Alaska highways.
3. Warehouses, hangars, varied structures for the Army and Navy.

Many assignments we are not permitted to discuss, but all of them, war and pre-war, have resulted in organization technique that is available to you for post-war construction.

Wouldn't this be a good time for you to check into the economy, strength, low maintenance and permanence of timber as a building material? A new book of our work *"Engineering in Wood"* is available on request. We're prepared to serve you in timber, allied structural materials.

Engineering in Wood

TIMBER STRUCTURES INCORPORATED

Portland 8, Ore. New York 17, N. Y.

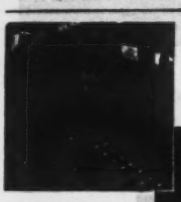
Watch Your Equipment GET UP and GO!

Change your stationary machines to mobile units for extra efficiency and extra value to users. Many manufacturers have found that their products really start GOING PLACES when they start them ROLLING!

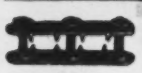
EWC Wheels and Mountings can help work wonders for you. Write for Illustrated Bulletins --and sound engineering advice based on over 90 years of experience. » «

EWC WHEELS

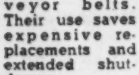
Electric Wheel Co., Quincy, Ill.



KEEP YOUR CONVEYOR BELTS GOING



FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.



FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

● Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco belt fasteners. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy.

FLEXIBLE STEEL LACING CO.

4638 Lexington St., Chicago 44, Illinois

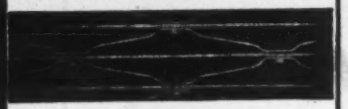
FLEXCO BELT FASTENERS

Sold by supply houses everywhere

IRVING GRATING

FLOORING AND STAIR TREADS

"A Fitting Grating for Every Purpose"

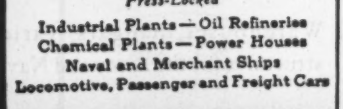


Riveted

Walkways — Stair Steps — Platforms
Trucking Aisles — Trench Covers

Press-Locked

Industrial Plants — Oil Refineries
Chemical Plants — Power Houses
Naval and Merchant Ships
Locomotive, Passenger and Freight Cars



Welded

Catalog for the asking.

IRVING SUBWAY GRATING CO., INC.

ESTABLISHED 1902

HOME OFFICE and PLANT: 5005 27th STREET, LONG ISLAND CITY 1, NEW YORK

WESTERN DIVISION: FOOT OF PARK AVE., EMERYVILLE 8, CALIFORNIA

POSTWAR PROJECTS (Cont'd.)

N. Y., Oswego—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at North Ave., Master, Paige and E. Temple Sts., Case No. 7688, and Green St., Case No. 8145, for R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O. $415,785. CD 12/15—ENR 12/23.

★**N. Y., Oyster Bay**—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Massapequa Rd., Case 4631, for Long Island R. R. Co., C. E. Adams, ch. engr., Penna. Sta., New York. $689,000. CD 12/15—ENR 12/23.

N. Y., Pattersonville—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination, Case No. 6410, for New York Central System, 466 Lexington Ave., New York, S. E. Armstrong, ch. engr. $279,153. CD 12/15—ENR 12/23.

N. Y., Syracuse—Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Hiawatha Blvd., Case No. 10378, for New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, and Delaware, Lackawanna & Western R. R. Co., C. A. Phillips, ch. engr., Passenger Terminal, Hoboken, N. J. $330. CD 12/15—ENR 12/23.

★**N. Y., Rockville Center**—State Dpt. P. Wks., State Office Bldg., Albany, Zone 1, plans completed grade crossing elimination at Merrick Rd., Nassau, Banks, Center, Village, Park, Morris, Forest and Ocean side Aves., Long Beach Rd., Case No. 7, for Long Island R. R. Co., C. E. Adams, ch. engr., Penna. Sta., New York, $2,750,000. CD 12/15—ENR 12/23.

STREETS AND ROADS

PROPOSED WORK

Ill., Champaign—City, City Hall, widen Daniel St., from First to Wright Sts., $18,000; Chalmers St., from First to Wright Sts., $18,000; White St., between State and First Sts. $7,000; State St. between Springfield Ave. and Washington St., $15,000; widening, reconstructing 6 St. from Green to Armory Sts., $15,000; Fourth St., from Green to Armory Sts. $21,000; East John St., from First to Wright Sts. $35,000.

★**Ill., Danville**—Vermilion Co., Co. Bldg., concrete paving 1.3 mi. S. A. Route 1, Sect. 50-M.F.T., Henning and 1 mi. north, $53,000; 1.5 mi. S. A. Route 30, Sect. 46-T., Union Church to Snide Store, $67,000; 7.5 mi. S. A. Route 9, Sect. 48 M.F.T., Catlin west of Fairmont, $360,000; 5.6 mi. S. A. Route 8, Sect. 49-M.F.T., Fairmount West Co. Line, $264,000; bituminous A type base 1.4 mi. S. A., Route 28, Sect. 45-M.F.T., Gessie Rd., $12,000; Proj. 3, south east bdry. line, considered as alternate entrance to Danville from S.B.I. Route 1, to east side business area, beginning at Airport property east end of E. 14 St., and Greenwood Cemetery and consist of new hy. north and south end of Park St., continuing to east side of business dist., connecting with Proj. 4, etc., $400,000; Proj. 4, alternate S.B.I. Route 1, into Danville from North Open and reconstruct N. Jackson St., construct 42 ft. pavement north from business dist. point approx. ¼ mi. north of Newell Ave., connecting to existing 4 lane pavement on Dixie Hy., $400,000; Proj. 5, North East Bdry. Line and Industrial Route, beginning at North Griffin St. at East Main St. continue north to city limits to Voorhees St., open new highway and construct overhead brs. across Wabash tracks, continuing north to Winter Ave., extended and making connection with Bowman Ave. pavement, thence curve northwesterly making connection with proposed North Jackson St. imprv. at approx. East Newell Ave., incl. overhead cross. with C & E I. Railway, Big Four Railway and new highway bridge across Stoner Creek, $350,000. W. C. Dye, County Bldg., engr. hys.

Wash., Bremerton—City, City Hall, widening Burwell St. $75,000; 5 St. from Park to Naval Ave. $90,000; 6 St., Pacific St. to Wycoff Ave. $200,000; new West End approach Manette Bridge, Washington Ave. to Pacific St. $100,000.

B. C., New Westminster—City, Mayor M. construct low level road from Columbia St. to 6 Ave., parallel to B. C. Electric Railway track, serving North Arm industries, $[illegible] 000; open up new subdivision on 8 Ave. providing 400 building lots, $400,000.

PLANS UNDER WAY

Connecticut—State Hy. Dpt., Hartford, plant 25% completed 4 lane, reinf. super-highway, Fairfield Co., $[illegible] W. J. Cox, State Office Bldg., Hartford, engr. CD 10/7/43—ENR 10/14/43.

Ga., Thomasville—City, City Hall, imp. streets, $300,000. Financing not provided. Wiedeman & Singleton, Candler Bldg., Atlanta, consult. engrs. C. E. Layton, Thomasville, city engr.

★**Illinois**—State Div. Hys., Springfield, plans 40% completed relocating Sec. Route 13, 8 mi. concrete hy. outside of Murphysboro and 2 mi. within corporate limits of Murphysboro, part of road also within corporate limits of Somerset, incl. 1 br. with steel superstructure and concrete piers, concrete reinforced steel floor, and 1 overhead crossing and 2 underpasses, all concrete before approaches to bridge.

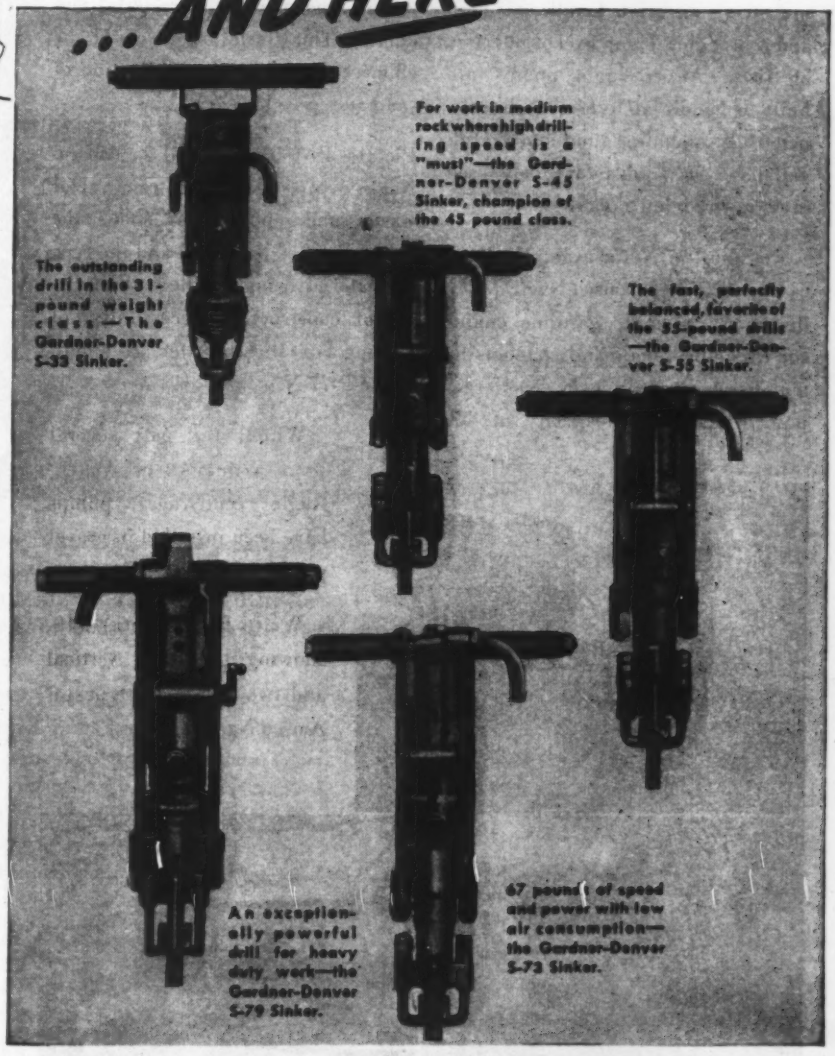
BALANCE COUNTS HERE ... AND HERE

Perfect Balance

, that's what makes Gardner-nver Sinking Drills so popular h contractors and operators e.

For that perfect balance means oth, easy riding. And easy ng means less fatigue . . . ws the men to put in more tage per shift—every shift.

Gardner-Denver Sinkers are ed for their hole-cleaning lity—their drilling speed and erful four-pawl rotation. For t extra performance you want a sinking drill . . . for speed, pendability and low-cost ration, check the Gardner-nver line. There's a champion very weight class.


The outstanding drill in the 31-pound weight class—The Gardner-Denver S-33 Sinker.
For work in medium rock where high drilling speed is a "must"—the Gardner-Denver S-45 Sinker, champion of the 45 pound class.
The fast, perfectly balanced, favorite of the 55-pound drills—the Gardner-Denver S-55 Sinker.
An exceptionally powerful drill for heavy duty work—the Gardner-Denver S-79 Sinker.
67 pounds of speed and power with low air consumption—the Gardner-Denver S-73 Sinker.

For complete information and specifications, write Gardner-Denver Company, Quincy, Ill.

Since 1859 **GARDNER-DENVER**

Small Pumps Have Place in Dredging and Sand Wasting

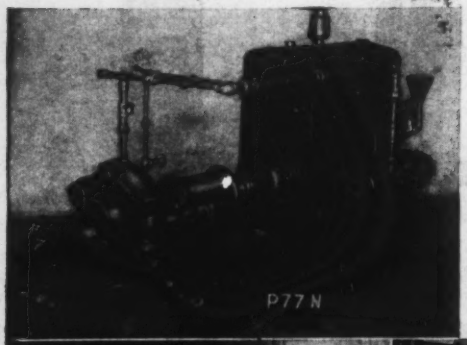
Amsco is a familiar mark on dredge pumps of the larger sizes but not so well known in the dredging field are Amsco-Nagle Industrial Pumps, although there are many logical waste handling and wash water circulating applications for them. There is no fundamental difference between an industrial material handling pump and a dredging pump except in range of sizes. Amsco-Nagle pumps are built to handle all types of abrasive materials, including sand and gravel, and have been advantageously used even in dredging operations.

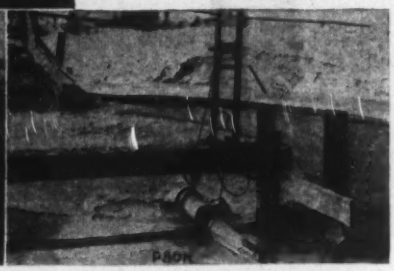
Picture P-77-N, for example, shows a 4" and a 1½" Amsco-Nagle pump driven by a single gasoline engine for dredging canals and channels by a midwestern state agency. The larger unit, which has a capacity of 400 g.p.m. and is designed for a head of 50', is the dredging pump. The smaller unit is used for priming the dredge pump and for supplying seal water to the stuffing box. The dredging pump is manganese steel-fitted, and its Class "D" impeller is selected to withstand abrasion and to allow the passage of oversize material and debris. This installation could be efficiently used for the production of sand and gravel.

Picture P-79-N shows a 6" Amsco-Nagle pump used for the removal of waste sand, and P-80-N shows the suction end of the pump and the type of material being handled. (Simplicity of construction, accessibility of stuffing box and impeller are apparent in P-77-N.)

Within the past several years a number of Amsco-Nagle centrifugal pumps have been installed in gravel plants.

Write for Bulletin 940, showing the three vertical and two horizontal types of Amsco-Nagle Pumps.





The features of Amsco Renewable Lip Dippers are covered in Bulletin 641-D.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY

POSTWAR PROJECTS (Cont'd.)

$500,000. W. W. Pe... Centennial ... Springfield, state hy. engr. and I. J. ... Illinois State Hy. Bld... S. B. I. Rou... West, Carbondale, dist. hy. engr.

Ill., Danville—City, City Hall, made ... veys resurfacing var...ble widths, 6.2 ... **$98,200**; 1.6 mi. conc...e on existing ... ment location that ca...not be resurfac... that needs room for ...xtra traffic, $2... F. Roseman, city engr.

★**Ill., Danville**—Ver...ilion Co., C... Bldg., plans 5% ...completed moder... tion of S.B.T. Route 10, U. S. Route 150, ... and through city of D...nville beginni... east side of Oakwood ... and incl. reloc... through Ellsworth Par..., subway under ... Four tracks at Vermilion Heights, and ... bridge over North Fork River of Verm... River, construction of subway under W... R. R. on Route 10 as it may be locate... widening and imprv. Route 10 from Lak... east of city limits, etc., **$2,000,000**; Fr... modernization of S.B.I. Route 1 beginni... Gilbert St., and Wabash overhead in ... Danville, and exten. north to West Fair... St., shall be entirely reconstructed, ... subway under Big Four tracks on Gilbe... and under Big Four tracks on North ... million St., modernization of Old Dixie ... in Ridgefarm area, exten. from Olivet ... lage to co. line south of Ridgefarm and ... construct bridge over Big Vermilion Riv... South Gilbert St., to provide at least 4 ... of traffic and sidewalks, **$600,000**; plans ... completed concrete paving 1.5 mi. ... Routes 23 and 5, Sect. 47-M.F.T. ea... Georgetown, **$285,000**; subway and 0.3... pavement S.A. Route 29, Sect. 37-M.F... Campbell Station, **$75,000**; plans 20% ... pleted grading bridge approach 2 mi. ... Route 20, Sect. 36-A, Lake Rd., **$2...** plans 40% completed concrete paving 0.... S.A. Route 14, XI-M.F.T., West of Rom... **$35,000.** W. C. Dye, County Bldg., co ... hys.

Miss., Hattiesburg—City plans 50% ... pleted curbing, guttering, paving, ... bridges, culverts. **$250,000.** Financing ... provided for. J. R. Estes, city engr.

★**N. Y., New York**—President Manh... Boro, W. D. Binger, comr. Boro ... Municipal Bldg., Zone 7, plans under ... repaving Centre St., Park Row to Foley ... **$14,000**; Reade St., Foley Sq. to West B... **$29,000**; Duane St., Foley Sq. to Hudson ... **$30,000**; Pearl St., Foley Sq. to Bway., ... Foley Sq., **$14,000**; Maiden Lane, William ... to Bway., **$10,000**; Beekman St., South ... Nassau St., **$30,000**; Spruce St., Gold to ... sau St., **$8,000**; Amsterdam Ave., 86 t... Sts., **$33,000**; West End Ave., 62 to 63 ... **$59,000**; Lexington Ave., 96 to 130 St., ... 700; John St., Pearl St. to Bway., $1... Vesey St., Bway. to Church St. and ... Bway. to West St., **$12,000**; Day St., Be... to West St., **$18,000**; Barclay St., Bway ... West St., **$21,000**; Park Place, Bway ... West St., **$28,000**; Murray St., Bway. to ... St., **$28,000**; Warren St., Bway. to Wes... **$30,000**; Chambers St., Park Row to B... and West Bway. to West St., **$39,000**; ... Chambers St., Cherry St. to Park Row, ... 000. D. G. Edwards, ch. engr. State ... Planning Funds allotted.

Okla., Lawton—City, plans 20% compl... residential pavement, resurfacing and c... widening, **$300,000.** Financing not yet pr... ed for. W. B. Hendricks, City Hall, en...

Okla., Tahlequah—City, R. J. Wi... mayor, City Hall, addnl. street pavement ... widening streets in business section, $5... Financing not yet provided for. R. J. D... City Hall, Bldg., engr.

Ore., Oregon City—City, City Hall, s... and alley work. **$100,000.** A. E. Millet, ... engr.

★**Pa., Allentown**—City Comrs., wide... 4 St. from Walnut to Turner Sts., $... 000; Jackson St. from 8 to 10 Sts., $3... Tilghman St. from Front to Broad ... **$500,000**; Auburn St. from 5 to 6 ... **$75,000.** Russell Van Nest Black, ... Pensylvania Planning Bd., Mt. Joy, cons... engr. E. J. Meckley, City Hall, city eng...

Diamond Core Drilling Contractors

FOUNDATION TESTING
Dams, Heavy Structures, etc.
STAGE SECTIONAL
PRESSURE GROUTING
Contract or Rental

MFR'S DIAMOND & SHOT CO... DRILLS GROUT MIXING MACHINE... PACKERS AND GROUT PUMPS.
MOTT CORE DRILLING CO...
HUNTINGTON, W. VA.

J. A. Gallagher, Madison, Wisc., contractor uses a Universal 546-P primary unit with 20" x 36" jaw crusher in Viroqua, Wisc. quarry. Plant is electric-powered.

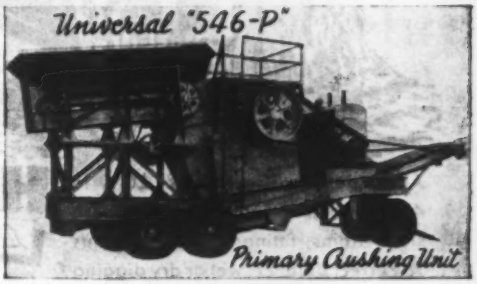
Below: Beu & Sons use a 546-P primary unit with 20" x 36" crusher for primary reduction of limestone at Ackley, Iowa. Secondary plant has No. 4 Universal Pulverizer.

The 30" x 42" Welded Steel Plate Roller Bearing Crusher on this 546-P Primary Unit increases output for Art Overgaard's No. 1 plant at Cashton, Wisc. This is the third 546-P unit purchased by this operator.

Quarries step-up output with this UNIVERSAL Primary Unit!

These Universal Portable Primary Crushing Units greatly increase output for quarries because larger chunks of shot rock need not be rejected or sledged. In addition, they increase the output of secondary crushers by delivering material of a more uniform size to them.

Made in four sizes: 16" x 24", 20" x 36", 24" x 36" or 30" x 42" jaw crushers. Apron feeder empties onto bar grizzly with bypass chute for material suitable for secondary unit. Apron feeder can be readily detached and slid off onto a truck to facilitate hauling. Ideal for use with Universal 822-Q, 410-Q, 880 and other plants as well as *other makes* of quarry plants that need to be geared to tomorrow's requirements. Send for details.



UNIVERSAL ENGINEERING CORPORATION
633 C Ave. West, Cedar Rapids, Iowa

ARMY E NAVY

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Start Post-War Planning Now!

WET DIGGING WITHOUT A SLOWDOWN

Every extra yard of material you can dig from a watery pit means a quicker profit on your operations. You can get this extra yardage by using a Hendrix Bucket. Its round-perforated design makes it a "natural" for wet digging . . . lets the water go through . . . leaves more room on the inside of the bucket for extra payloads.

Three types, light, medium, heavy duty. Sizes 3/8 to 20 cu. yds. with or without perforations.

All-welded construction ★ 20% to 40% lighter weight ★ Manganese steel chains, fittings and toothpoints ★ Perfect balance, wet or dry digging

HENDRIX *Lightweight* **DRAGLINE BUCKETS**

DESOTO FOUNDRY, INC. · MANSFIELD, LOUISIANA

POSTWAR PROJECTS (Cont'd.)

Pa., Lancaster—City Comrs., rebuilding various streets $379,426; curbs and sidewalks $37,000. Financing not provided for. J. J. Shertzer, city engr.

★**Tex., Houston**—Harris Co., c/o Judge, Courthouse, $2,000,000 bond election Nov. 7, road work. H. Zapp, Courthouse, co. engr.

Tex., Port Arthur—City, street paving imprvs. $150,000. J. R. Converse & Co., Port Arthur, engrs.

Wash., Longview—City, City Hall, widening, paving Nichols Blvd., 32nd Ave. to city limits. $57,000. J. Jones, city engr.

READY FOR BIDS

Ill., Danville—Vermilion Co., County Bldg., plans completed concrete pavement 2.3 mi. S.A. Route 20, Sect. 36, Lake Rd., $120,000; 2.25 mi. S.A. Route 21, Sect. 43-154, Pilot School, S.B.I. Route 49, $56,000. W. C. Dye, co. supt. hys.

EARTHWORK, WATERWAYS

PROPOSED WORK

Okla., Lawton—City, E. Glenn, mayor, drainage, $25,000.

Ont., Brantford—Municipality, c/o J. P. Ryan, mayor, river imprv. works, $30,000.

PLANS UNDER WAY

Conn., Greenwich—Town, W. M. Peck, First selectman, Town Hall, dredging Byram Park Harbor, $17,000. S. E. Minor & Co., Inc., Smith Bldg., consult. engr.

Ill., Decatur—Decatur Park Dist., Decatur Club Bldg., plans completed grading, drainage necessary toward filling in new park playground at Lincoln Park, $100,000; draining, grading necessary to filling in new park playground at South Side Park, $25,000. Financing not yet provided for.

Mich., Grosse Pointe Park—Village, 15115 Jefferson Ave., Zone 30, plans underway reclaiming land in low area for refuse dump $25,000. E. B. Lane, village mgr.

Mich., Wyandotte—City, City Hall, preliminary plans underway concrete seawall 1,600 lin. ft. wall on piling fdn. for breakwater at Bishop Park. $84,000. F. W. Liddle, city engr.

Miss., Hattiesburg—City, malaria control ditches and canals. $150,000. J. E. Eaton, city engr.

N. Y., New York—President Manhattan Boro, W. D. Binger, comr. Boro Wks., Municipal Bldg., Zone 7, imprv. Bristol Boat Basin, East River between 25 and 26 Sts. (PM-151), $25,000. D. G. Edwards, ch. engr. CD 2/4—ENR 3/24.

O., Cleveland—Dpt. P. Utilities, E. J. Crown, dir., City Hall, preliminary plans steel plate reinforcing Crib 3. $75,000. G. M. Hamlin, city engr.

★**O., Warren**—City, river retaining wall, $1,300,000. Financing not provided for. W. S. Harvey, City Bldg., city engr.

★**Tenn., Memphis**—State, Shelby Co., and City of Memphis Health Dpt., c/o Dr. L. M. Graves, 879 Madison St., Memphis, constructing 16 health projects for malaria control in various drainage dist., incl. drainage, covering water drainage, ditch walls with concrete and sodding, areas, $300,000. H. C. Tuggle, 879 Madison St., engr. CD 6/1/43—ENR 6/3/43.

★**Tex., Port Neches**—Jefferson Co. Drainage Comn., F. E. Gifford, Port Arthur, plans underway, drainage in Precinct 2, $750,000. L. V. Norris, Beaumont and Chas. P. Smith, Orange, consult. engrs.

★**Tex., San Antonio**—City, city-wide drainage sys., over $1,000,000. Terrell Bartlett, Transit Tower Bldg., consult. engr. Thos. Coghill, City Hall, engr.

DOBBIE SHEAVE BLOCKS

Dobbie Foundry & Machine Co.
Niagara Falls, N. Y.
DERRICKS WINCHES SHEAVES

MITCO
OPEN STEEL FLOORING
Pressure Formed
90% Open Area
Easy to Install
Hendrick Manufacturing Company
45 Sandolf Street, Carbondale, Pa.

BULKHEADS - PILEDRIVING
WHARF CONSTRUCTION
MARINE RAILWAYS
Distributors for—
JABSCO GEARLESS SELF-PRIMING PUMPS
LUBER-FINER OIL REFINERS for Marine Engines
DELAWARE BAY SHIPBUILDING CO., INC.
LEESBURG, N. J.

READY—IN 17 SECONDS

REPRODUCTIONS OF YOUR DRAFTSMEN'S DRAWINGS, TYPED MATERIAL, OFFICE FORMS

this case, the operator is feeding a draftsman's pencil wing, size 17" x 22", and a piece of sensitized paper into machine. Smooth-running conveyor belts speed both ma- als around the printing cylinder . . . after which the draw- is automatically released, and the exposed paper goes up across the dry-developing tank.

Here comes the Ozalid print . . . an exact duplicate—not a negative, of the original. You'll find it dry, ready for immediate use. And there's a very unique reason for the short time required—only 17 seconds . . . and for the fact that the print has black, or red, or blue lines on a white background—whichever color was desired.

HY YOU MAKE PRINTS WITH THIS SPEED AND VERSATILITY

E ANSWER is in OZALID DRY DEVELOPNT . . . and what it has allowed designers chemists to do.

ince only one developing operation is loyed, the design of an Ozalid machine xtremely simplified. *So* compact in size can install it in a corner of the drafting n or office. *So* easy to understand that inexperienced person can quickly learn urn out prints with maximum efficiency ing cut sheets or roll stock.

lso consider the amazing line of sensid materials which react only to the *dry* ciple . . . and offer this choice whenever want to reproduce anything drawn, d, printed, or photographed on transnt material:

lack, Red, Blue Line standard papers ch allow you to assign identifying colors rints of different departments, to disuish checked from unchecked prints, etc.

ransparent Papers, Cloths, Foils ch you use to produce Intermediate Originals and Composite Prints or to reclaim worn or soiled drawings.

- **Opaque Cloths** which give you prints of exceptional durability.
- ***NEW* Dryphoto Papers** which produce beautiful reproductions with all the halftone details, from photographic film-positives or perspective drawings.

See all of these Ozalid Prints yourself—and learn the complete story.

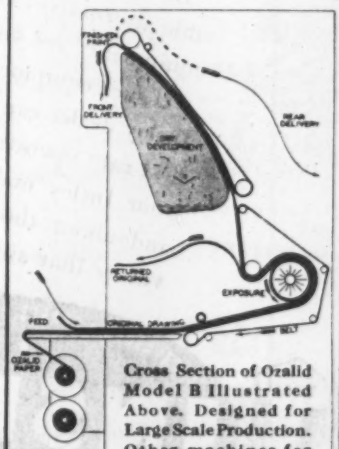
Write for "Simplified Printmaking" today.

ARMY E NAVY

OZALID

Division of
General Aniline and Film Corporation
Johnson City, New York

Ozalid in Canada—
Hughes-Owens Co., Ltd., Montreal



Cross Section of Ozalid Model B Illustrated Above. Designed for Large Scale Production. Other machines for lighter production or for use with blueprint equipment. Same *dry* principle, same advantages.

HERE'S HOW
Your Insley Dealer Can Help!

There is no immediate prospect of new Insley Excavators for civilian users. Insley is building cranes and similar material handling equipment . . . and this class of machinery now ranks high on the "critical" list.

In view of this situation, we suggest the only possible alternative: Do your very best to make present equipment "see you through."

If such equipment includes Insley Excavators, your Insley dealer can be a great help in keeping them in first-rate operating condition. See him today about your Insley maintenance and service program . . . and about those new and improved Insley Excavators that await you tomorrow.

EXCAVATORS • CRANES • BUCKETS • CARTS

INSLEY

CONCRETE PLACING EQUIPMENT

INSLEY MANUFACTURING CORPORATION

INDIANAPOLIS 1, INDIANA

POSTWAR PROJECTS (Cont'd.)

Wash., Longview—City, City Hall, tile a cover open ditch, fill ditch from 20 Ave. canal along Beach St. $25,000. J. Jon city engr.

Alta., Youngstown — Dominion Ge Ottawa, Ont., irrigation by diverting wa Red Deer River to Kirkpatrick La $150,000. P.F.R. Board McCallum H Bldg., Regina, Sask., engr.

B. C., Nelson—Municipality, exten La side Park seawall, $275,000. S. H. Daw City Hall, engr.

Ont., Hamilton—Lincoln Co., Hamil breakwater along south shore of Lake O tario. $100,000. F. W. Weir, County Bld St. Catherines, engrs.

PUBLIC BUILDINGS

PROPOSED WORK

★**Calif., San Francisco**—Bd. Educ., C Hall, E. E. Niccols, deputy Supt., 6 ye program: 1st year, gymnasium $460,0 auditorium $427,500, academic addn. $380,0 all for Abraham Lincoln School, 2 structur at Sunset Junior High School $1,290,0 Ulloa Elementary School $427,500; 2nd ye addnl. classrooms at Francisco Junior Hi School $675,000, administration and cafete structure for the San Francisco Junior C lege $962,500, auditorium $495,000, gymnasi for Portola Junior High School $375,000, ce tral warehouse for Bd. Educ. $850,000; 3 year, gymnasium for Lowell High Scho $172,500, San Francisco Junior College libra $625,000, 2 vocational schools at $775,000 e $800,000, administration bldg. for D $800,000, school at Ortega and 42 Sts., $46 000; 4th year, auditorium, band and mu structure for George Washington High Scho $177,150, addnl. classrooms at Lawton El mentary School $163,750, Mira Loma Scho $437,500, Mercer Manor School $437,500, 9 unit of Lake Merced School $265,000; 5 year, auditorium for James Denman Scho $370,000, school at Candlestick Cove $462,5 school at Hunters Point $462,500; 6th ye men's gymnasium $124,200, women's gy nasium $179,400 at San Francisco Jun College. CD 3/18/43—ENR 3/25/43.

†**Conn., Bethel**—Pub. Bldgs. Admin., and F Sts. N.W., Wash. 25, D. C., brick stone post office, $75,000.

†**Conn., Darien**—Pub. Bldgs. Admin., and F Sts. N.W., Wash. 25, D. C., brick, st post office, $85,000.

Conn., East Port Chester—Town, Gree wich Fire Dpt., Havemeyer Place, Greenwi brick, steel fire station, $160,000.

†**Conn., Greens Farms**—Pub. Bldgs. A min., 18 and F Sts. N.W., Wash. 25, D. C brick, stone, post office, $73,000.

†**Conn., New Canaan**—Pub. Bldgs. Admi 18 and F St. N.W., Wash. 25, D. C., bri stone post office, $133,000.

†**Conn., Ridgefield**—Pub. Bldgs. Admi 18 and F Sts. N.W., Wash. 25, D. C., bri stone post office, $95,000.

★**La., Natchitoches**—Louisiana State No mal College, Natchitoches, home e nomics bldg., social science-commerce bldg men's dormitory, women's dormitory a dairy, $1,000,000.

Me., Pownal—State, H. C. Greenleaf, com Institutions, State House, Augusta, brick steel, concrete, central heating plant, Sta School. $50,000.

Mich., Royal Oak—City, E. Shafter, supt City Hall, 221 E. Third St., library bldg $211,000; police station, $75,000; fire protec tion station, $50,000. CD 2/17—ENR 2/3.

O., Bexley—Bd. Educ., Bexley, schoo Maryland Ave. and Cassingham Rd. Bon election Nov. 7 for $310,000.

Okla., Tahlequah—City, electric pow plant imprvs., $40,000.

Pa., Allentown—Lehigh Co. Comrs., A lentown, court house and office bldg., $250,000.

DRILLING CONTRACTORS

CORE BORINGS

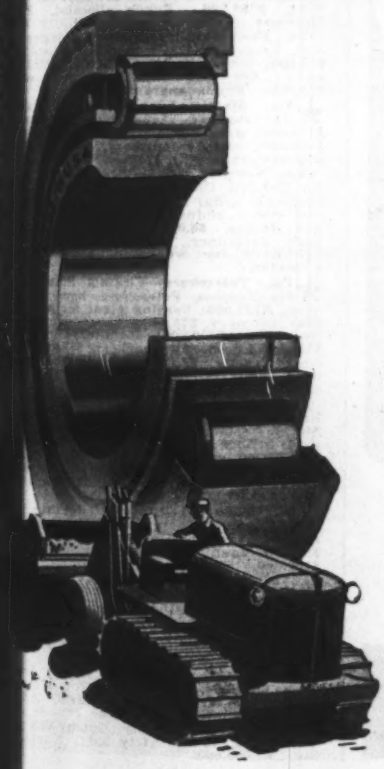
DIAMOND & SHOT CORE DRILLING

LOAD TESTS—TEST PITS

THE GILES DRILLING CORPORATION

18 East 48th Street New York, N. Y.

LONGER LIFE FOR FINAL DRIVES BEARINGS: HYATT



The design that gives the Allis-Chalmers "HD10" Diesel Tractors great power and speed, as well as a longer life span, includes Hyatt Roller Bearings in final drive assemblies.

The loads on the gears and bearings in final drives are high and constantly variable, due to the action of steering clutches. Hyatt is proud that Allis-Chalmers selected Hyatt Bearings for this vital location.

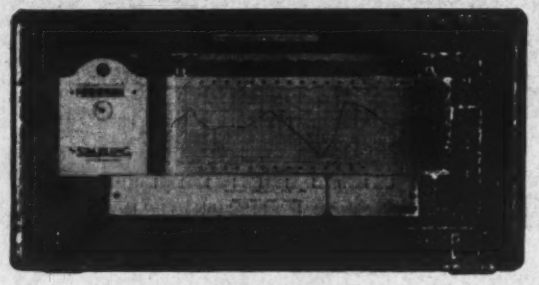
Year in and year out, Hyatts prove they can take it—just as they do everywhere else that shafts and wheels are turning on farm, highway, railway, mill and factory.

☆ *Hyatt engineers will be glad to help you on any present or future bearing design problem you may have.*

HYATT BEARINGS DIVISION GENERAL MOTORS CORPORATION
HARRISON, NEW JERSEY • CHICAGO • DETROIT • PITTSBURGH • OAKLAND, CALIFORNIA

SPARLING MAIN-LINE METERS

Used in
WATERWORKS
SEWERAGE
RAILROADS
PAPER MILLS
MINES
IRRIGATED LANDS
CAMPS
OILFIELDS
PIPELINES
TANKERS
REFINERIES



ACCURATE knowledge of main-line flows is indispensable. Sparling Meters, assuring consistent accuracy of measurement, are easily installed at comparatively little cost to give you complete information.

Get the facts from Bulletin 308.

SPARLING *Manufacturer of Water Measuring Equipment*

LOS ANGELES 54...Box 3277 Terminal Annex
CHICAGO 16.....3104 South Michigan Ave.
622 Broadway.....CINCINNATI 2
101 Park Avenue.....NEW YORK 17
BOSTON 8.....6 Beacon Street

BIG JOBS AHEAD

for YOU...
with JACKSON VIBRATORY HAND SCREED!

But before you tackle the big Post-War concrete contracting jobs, get acquainted with the wide scope in concrete surfacing operations offered by the JACKSON SC-4A vibratory hand screed. Its advantages include lightweight, uniform vibration and adaptability to reasonable widths of section. Gives complete puddling to low-water content concrete. Write for further details.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

POSTWAR PROJECTS (Cont'd.)

★**Tenn., Memphis**—Ed. Educ., E. L. supt., 317 Poplar St., school, Leano Heights. Over $1,500,000.

★**Tex., Commerce** — East Texas N. Teachers College, Commerce, power steam plant unit, $60,000; students bldg., $200,000; hospital bldg. and facilities, $150,000; Gymnasium, $ class instruction bldg., $150,000; storage warehouse, $60,000; rein. con. swim pool, $25,000; concrete, steel athletic dium, $50,000; concrete sidewalks, hard ing driveways, campus grounds develop drainage, etc., $75,000; increased water ply lines, water supply, etc., over $ sanitary sewer collection lines, imprvs., $25,000.

★**Tex., Houston** — Houston Indepen School Dist., 1600 Washington st., 500,000 bond, election Nov. 7, 3 high sch 4 junior high schools, 15 schools, new to existing schools, repairs, etc.

Tex., Pearland—Independent School D Pearland, school. $150,000. CD 1/24— 2/10, under Public.

Tex., Port Lavaca—City, enlarging mu house. $225,000.

Va., Blue Ridge—Blue Ridge Sanator Blue Ridge, infirmary addn., $220,000; face treatment main entrance road, $ boiler and stokers, $20,000; nurses h annex, $43,500; underground steam ma $20,000. Funds appropriated.

★**Va., Burkeville** — Piedmont Sanator Burkeville, nurses' home, $140,000; addn., pump and pipeline, $10,000; e power plant, boilers and stokers, $ structures, $68,673; shop machinery, $ remodeling administration bldg., compl of laundry, $21,000; service roads and g ing, $5,000; pump and pipelines, $ kitchen, dining room, storage bldg., eq $125,000; sewage disposal plant, $ staff house, $5,000; infirmary addn., $20 infirmary, $147,500. Funds appropriated.

Va., Catawba—Catawba Sanatorium, tawba, 120-bed infirmary replacing i frame bldgs., $240,000; staff apartment h addn., $8,000; nurses home addn., $ convict bldg., $8,500; physician dwel $5,000; renewal main steam lines, $ remodelling power plant, $10,000; repl ment steam lines, $5,920. Funds appro ated.

★**Va., Charlottesville**—University of ginia, dormitories, cafeteria, student tivities bldgs., $2,935,000; chemistry addn., $115,885; Rotunda equip., $ Rotunda completion, $44,900; hos kitchen addn., $47,350; completion inte quarters, $57,600; laundry addn. equip., 400; heating tunnels and increased ma $63,230; hospital laundry addn., $ underground electric distr. sys., $ nurses' home addn., $125,000; power p addn., $120,000; remodeling, firepro south wing old hospital, $225,000, and n wing, $286,000. Funds allocated. F Hartman, dir. Grounds & Bldgs.

Va., Fredricksburg—Mary Washington lege, Fredricksburg, renovating Willard $65,000; infirmary bldg., $75,000; dining addn., $60,000; boiler house and eq $85,000. Funds appropriated.

★**Va., Harrisonburg** — Madison Col Harrisonburg, Maury Science Hall ad $150,000; dormitory, $150,000; 1 dormito $150,000; college infirmary, $30,000. Fu appropriated. CD 2/25—ENR 3/9.

Va., Newport News—Virginia State Sch for Colored Deaf & Blind, Newport N academic bldg. and library, $87,240; b and stoker addns., barn and silo, sidew and fences, $6,000; dining hall, $ boys' dormitory, $95,000; remodeling l dormitory for workshop, $25,000. Fu allocated.

★**Va., Petersburg**—Virginia State Col for Negroes, Petersburg, home econo bldg., $127,000; heating plant facilities, $ 000; infirmary, $74,000; classroom and ar tles bldg., $150,000; dormitory for wo $100,000; home for teachers, $18,000; st road imprvs., $5,000; coal bin, siding heat plant facilities, $13,900. Funds a cated.

Va., Radford — State Teachers Col Radford, remodeling Tyler Hall Dormi $46,400; remodeling Madame Russell do tory, $22,900; dormitory bldg., equip., $ 000; boiler and stoker, $16,500; underg electric wiring, $5,000; sidewalks, $ driveways, $3,000, etc. Funds appropri CD 2/25—ENR 3/9.

Va., Richmond—State Penitentiary, R mond, security bldg. for difficult pris $85,000; 3 state convict road force c $50,000 each; storage bldg., Spring $100,000. Funds appropriated.

★**Va., Richmond**—University of Richm Richmond, library, $400,000; a dormitory at Westhampton College, $1

Va., Staunton—Virginia School for & Blind, Staunton, recreation bldg., $ 000; boys' dormitory, $75,000. Funds propriated.

★**Wash., Everett**—School Dist. 2, Sno $1,000,000 bond election, Nov. 7, mod zation of Washington, Garfield, Jeffe Longfellow and Silver Lake Schools.

★**Wash., Seattle**—City, County-City Zone 4, public safety bldg., 3 and Sts. $2,500,000.

DIG DITCHES WITH DYNAMITE

SAVE TIME... CUT COSTS... CONSERVE EQUIPMENT

ODAY'S SHORTAGES of manpower and equipment are making ditching with dynamite more attractive than ever before.

igging a ditch with dynamite is easy, quick and expensive—whether it is for highway construction, reclamation, straightening of channels, or for the nage of areas near dams, airfield runways, railds or industrial plants.

u Pont Ditching Dynamite 50% is especially deed for ditch digging. It can be used in soil containing a high percentage of water and detonated by the propagation method, or in drier soils and fired by the use of Electric Blasting Caps. Ditches may vary in depth from 2½ to 12 feet, and in width from 4 to 40 feet.

On your next job consider digging the ditches with dynamite. You'll find it saves time—reduces costs—conserves heavy equipment. Write for our new 32-page booklet, "Ditching with Dynamite." E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

INVEST IN VICTORY—BUY WAR BONDS

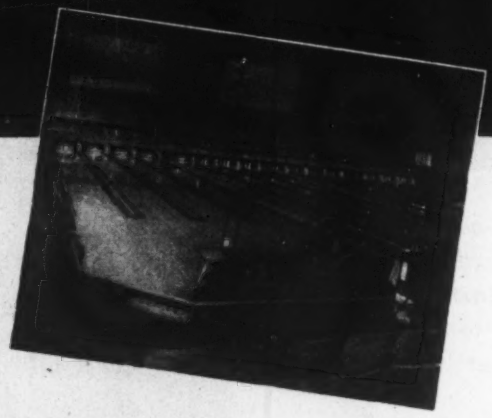
DU PONT

efore and after digging a drainage ditch with Du Pont Ditch- Dynamite. Note absence of dirt piles at side of ditch.

Get this new Ditching Booklet. Write for your copy of "Ditching with Dynamite." This new 32-page booklet completely describes the methods used in ditch blasting. Tells how to prepare the charge, and illustrates the methods of priming and shooting. Contains useful tables giving amounts of dynamite required for given widths, depths and lengths.

DU PONT DITCHING DYNAMITE

Note to Buyers Looking for Good Heating



You can buy Reznor Unit Heaters without certificates of any kind. The only restriction is on the use of gas, and the rulings differ for different sections. Check with your gas company.

REZNOR HAS A HEATER FOR ANY SIZE SPACE

Reznor Unit Heaters are available in nine sizes. Your choice will depend upon the size of area to be heated. Automatic Reznor Unit Heaters serve either as auxiliary or primary heat in such installations as factories, offices, stores, garages, homes, churches, bowling alleys, restaurants, and many, many other places.

The sooner you place your orders, the quicker you will get your heaters. Materials are coming through in limited quantities, and your deliveries will be made just as soon as possible.

WIRE!

PHONE!

WRITE!

REZNOR MANUFACTURING CO. **REZNOR** 105 JAMES STREET MERCER, PENNA.

"GAS HEATERS EXCLUSIVELY SINCE 1888"

POSTWAR PROJECTS (Cont'd.)

Wis., Milwaukee—Pub... Museum of ... City of Milwaukee, ... Wisconsin A... Zone 3, W. C. McKern, ... museum b...

Alta., Coleman—Municipality, ... district hospital. **$150,000**.

B. C., Slocan City—Municipality, ... W. E. Graham, city ..., power pl... **$75,000**.

N. S., Kentville—Municipality, A. J. M... donald, clk., town hall and fire stati... **$160,000**.

Ont., Brantford — Municipality, E. ... Campbell, clk., auditorium, **$150,000**.

Ont., Goderich—Pub. School Bd., Goder... Central school, **$150,000-$200,000**.

Ont., Ottawa—Public School Bd., Gilm... St., Elmdale school addn. **$150,000**.

Ont., Port Arthur—Port Arthur Cham... of Commerce, L. Wood, pres., 234 High St., ... civic auditorium containing library, sw... ming pool, gymnasium, etc. About **$400,...**

Ont., Toronto—University of Toronto, ... ronto, new central heating and power pl... **$100,000**.

Ont., Toronto—Wellesley Hospital, ... Homewood Pl., nurses' residence. **$150,...**

★**Que., Montreal** — City Improvem... League, City Hall, auditorium, Dorch... ter St. W. **$3,500,000**.

Sask., Outlook—Dominion Govt., Otta... Ont., plans by Dpt. P. Wks., Ottawa, O... post office bldg., **$150,000**.

Sask., Outlook—Municipality, c/o Ma... J. C. Carter, City Hall, community cen... **$150,000**.

PLANS UNDER WAY

★**Calif., Arcadia**—City Bd. Educ., Arca... working drawings by P. Kingsbury, ... Washington Bldg., Los Angeles, rein.-c... intermediate school, incl. 16 classrooms, ... fices, auditorium, cafeteria, shop, foot... field, etc. **$500,000**.

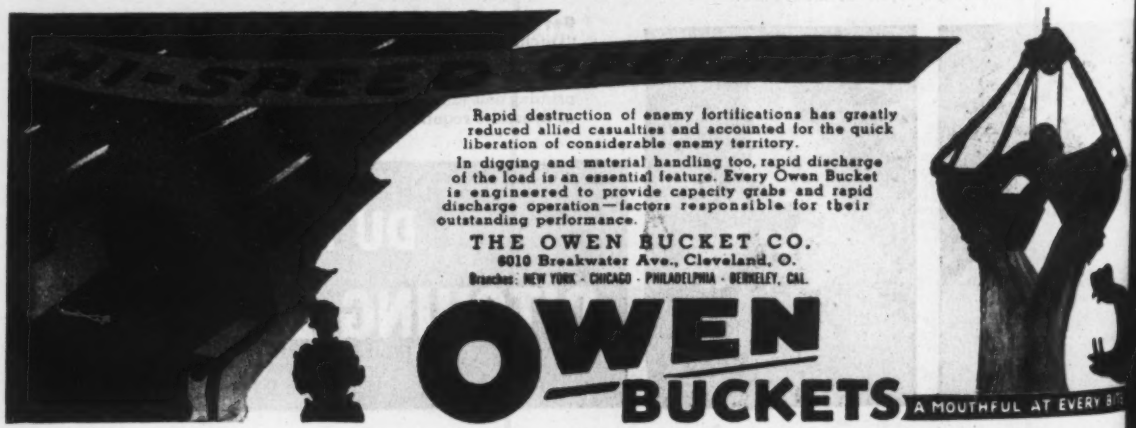
★**Calif., Berkeley**—University of Califor... c/o Comptroller, Berkeley, plans by ... Geoffrey Bangs, 605 Market St., San Fr... cisco, chemistry laboratory, **$600,000**; pl... by A. Brown, Jr., 251 Kearney St., ... Francisco library annex, **$1,000,000**; plans ... W. G. Corlett, Bank of America Bldg., O... land, Engineering design bldg., **$1,000,...** plans by W. C. Perry, 260 California ... San Francisco, Jurisprudence bldg., **$675,...** CD 8/24—ENR 9/7.

★**Calif., Westwood** — University of C... fornia at Los Angeles, Westwood, pl... by Allison & Ribble, 305 Quinby Bldg., ... Angeles, engineering bldg., **$1,250,000**; pl... by Marsh, Smith & Powell, 516 Archit... Bldg., Los Angeles, life and science bl... **$1,000,000**; plans by Heitschmidt & Match... 417 S. Hill St., Los Angeles, library ad... **$750,000**; plans by J. C. Austin, 608 Cham... of Commerce Bldg., Los Angeles, busi... administration and economics bldg., **$7...** 000; plans by D. H. McLellan, 816 W. 5... Los Angeles, administration bldg., **$250,...** plans by Allison & Allison, 312 Qu... Bldg., Los Angeles, social science bl... **$750,000**; plans by P. R. Hunter, 627 ... Carondolet St., Los Angeles, women's g... nasium, **$300,000**.

Conn., Hartford—City Municipal Bl... 550 Main St., brick, steel municipal ... addn., Arch and Sheldon Sts. **$150,...** R. J. Ross, city engr.

Ill., Danville—City, City Hall, city ... **$250,000**. F. Roseman, city engr.

★**Ill., Freeport**—School Dist. 145, Free... plans under way by Smith, Kra... Strong, Urbana, Junior High School ... exten. Senior High School, brick, ... etc., **$750,000-$850,000**. CD 4/14/43—... 4/22/43.


Rapid destruction of enemy fortifications has greatly reduced allied casualties and accounted for the quick liberation of considerable enemy territory.
In digging and material handling too, rapid discharge of the load is an essential feature. Every Owen Bucket is engineered to provide capacity grabs and rapid discharge operation—factors responsible for their outstanding performance.
THE OWEN BUCKET CO.
6010 Breakwater Ave., Cleveland, O.
Branches: NEW YORK - CHICAGO - PHILADELPHIA - BERKELEY, CAL.
OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

. . . IT HAS THE NEW FRUEHAUF STEEL ⌒ RIBBED FLOOR

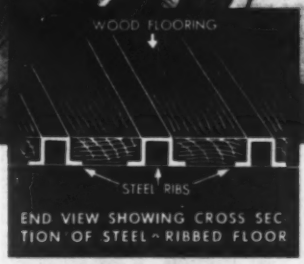
THE NEW Fruehauf **STEEL⌒RIBBED** floor in freight vans is built to take abuse—for extra strength has been added where it's needed most.

This new floor, a patented Fruehauf feature, is capable of withstanding a concentrated load of 1000 pounds per square foot—some 2½ times more than a conventional all-wood floor of the same thickness. It is a radical departure from the old-fashioned "tongue and groove" construction.

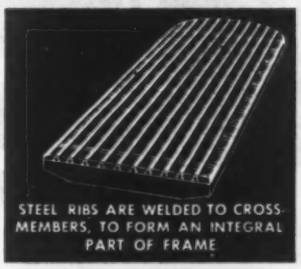
High-tensile steel ribs running substantially the full length of the Trailer are welded to all chassis cross-members and form an integral part of the frame. The flanges of the ribs support the floor boards, and the ribs themselves are flush with the top of the floor . . . giving a smooth, long-wearing surface.

Hardwood floor boards are bolted down between the rugged steel sections, and each floor board is backed up by metal throughout its entire length. Thus, expansion or contraction of boards will not open up cracks in the floor. And this weather-stripping reinforcement also serves to eliminate the "buckling" which frequently develops in floors of conventional design.

Besides greatly increased floor strength and frame rigidity . . . with longer floor life . . . servicing is no longer a "headache." With the new construction, any board can be replaced without disturbing the rest of the floor since there are no "tongues" or "grooves" to worry about and matched lumber is not required.



END VIEW SHOWING CROSS SECTION OF STEEL ⌒ RIBBED FLOOR


STEEL RIBS ARE WELDED TO CROSS-MEMBERS, TO FORM AN INTEGRAL PART OF FRAME

CONCENTRATED LOAD LIMIT 400 LBS. PER SQ. FT.

CONCENTRATED LOAD LIMIT 1000 LBS. PER SQ. FT.

FRUEHAUF TRAILER COMPANY • DETROIT

WORLD'S LARGEST BUILDERS OF TRUCK-TRAILERS

SERVICE IN PRINCIPAL CITIES

BATES • GRATES

for Needed Construction

Priorities allow the use of steel for **BATES • GRATES.** Check now . . . send **BATES** your specifications. Your request will receive immediate attention.

BATES MEANS STRONGER, SAFER STEEL TREADS AND FLOORING FOR YOU

The patented fillet weld on the Hex cross bars of **BATES•GRATES** gives you a combination of maximum strength and floor safety . . . **PLUS** easier maintenance. That's why it's so much more worthwhile to specify **BATES • GRATES** for your open steel stair treads and flooring.

The new 16-page **BATES** *Book offers you new ideas for plant planning. It tells you what you want to know about open steel flooring. Write for your copy today.*

WALTER BATES COMPANY, INC.
JOLIET • ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

POSTWAR PROJECTS (Cont'd.)

Ind., Connersville—Bd. School Trustees, plans by W. E. Hanson, 715½ Central Ave., 2 story, brick, stone, rein.-con. school. $175,000. Financing not provided for.

Ind., Terre Haute—Indiana State Teachers College, 6 and Cherry Sts., plans 90% completed by Miller & Yeager, 200 Opera House Bldg., 2 story, brick, steel, rein.-con. library. $150,000. CD 1/10—ENR 1/27.

Ia., Waukon—City, T. G. Slitor, clk., City Hall, municipal light and power plant. $40,000. Stanley Eng. Co., Muscatine, consult. engr.

Me., Augusta—Dpt. P. Bldgs., State House, plans 25% completed by Bunker & Savage, 256 Water St., brick, steel police headquarters addn. $150,000.

Me., Pownel—State, H. C. Greenleaf, comr. Institutions, State House, Augusta, plans by A. J. Harriman, 88 Shepley St., Auburn, 2 story, brick, steel dormitory for 200 girls, $175,000; 2 story, brick, steel, concrete dormitories for 200 boys, $175,000; employees bldg., $100,000, all at State School. CD 1/17—ENR 1/27.

Mass., Amesbury—Town Bd. Selectmen, Town Hall, plans by Kilham, Hopkins & Greeley, 216 Newbury St., Boston, town hall, Main and School Sts. $250,000. CD 8/5/43—ENR 8/12/43.

★**Mass., Boston**—Commonwealth of Massachusetts, Dpt. of P. Health, State House, plans completed by Curtin & Riley, 45 Newbury St., brick, steel chronic patients hospital, PH-8. $3,800,000. Land rights not cleared, financing not provided for. CD 9/28—ENR 10/5.

★**Mass., Charlestown**—Commonwealth of Massachusetts, Dpt. Correction, State House, Boston, plans by Thompson & Lichtner Co., Inc., 620 Newbury St., Boston, 4 story, brick, steel industrial bldg., PP-6, State Prison, $650,000.

★**Mass., Chelsea**—Commonwealth of Massachusetts, Emergency Pub. Wks. Comn., Nashua St., Boston, plans underway by Perry Shaw & Hepburn, 141 Milk St., Boston, 3 story, brick, steel hospital, Soldiers Home, Crest Ave., EV-3, $750,000.

Mass., Danvers—State Dpt. Mental Health, 100 Nashua St., Boston, sketches by M. A. Dyer Co., 9 Beacon St., Boston, 2 story bsmnt., 60x100 ft., brick, stone laundry, State Hospital, PM-44. $90,000.

Mass., Framingham—Commonwealth of Massachusetts, Dpt. Correction, State House, Boston, plans by The Newbury Associates, 71 Newbury St., Boston, brick, steel hospital and reception center, PP-5, $175,000.

Mass., Holyoke — City, Bd. Educ., City Hall, plans by Kilham, Hopkins & Greeley, 126 Newbury St., Boston, brick, steel Central Junior High School, Highland, Oakdale and Elmwood Sts. Over $150,000. CD 3/16—ENR 4/6.

Mass., Northampton — Commonwealth of Massachusetts, Dpt. Mental Health, 100 Nashua St., Boston, plans by S. W. Haynes & Assoc., 236 Main St., Leominster, fireproof construction floor imprvs., State Hospital, PM-8. $160,000.

★**Mass., Pondville** — Commonwealth of Massachusetts, Dpt. Pub. Welfare, 15 Ashburton Pl., Boston, plans by Maginnis & Walsh, 126 Newbury St., Boston, brick, steel hospital. $2,750,000.

Mass., Taunton—Commonwealth of Massachusetts, Dpt. Mental Health, 100 Nashua St., Boston, plans by O. A. Thayer, 45 Franklin St., Boston, brick, steel laundry, PM-46. $85,000.

Mass., Worcester — Commonwealth of Massachusetts, Dpt. Mental Health, 100 Nashua St., Boston, plans by L. W. Briggs Co., 90 Park Ave., fireproofing first floors designated bldgs., State Hospital, P-42. $215,000.

Mich., Grosse Pointe Park—Village, 15113 Jefferson Ave., Zone 30, plans underway garage. $50,000. E. B. Lane, city engr.

Mich., Iona—State Bldg. Dpt., A. N. Langius, dir., Lansing, plans underway remodeling Iona State Hospital. $715,000.

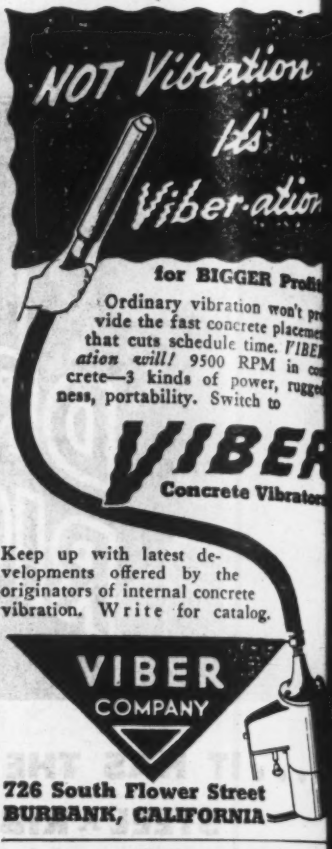
Mich., Kalamazoo—City, preliminary plans by Louis G. Kingscott & Assoc., 208 Elm St., Kalamazoo, brick, stone, concrete, steel civic bldg. $200,000.

Mich., Wyandotte—City, plans by C. P. Campbell, Wyandotte, brick, stone, steel, concrete veterans memorial bldg. $275,000. F. W. Liddle, City Hall, city engr.

Mich., Wyandotte—City, plans under way, 2 story, bsmnt., brick, steel, concrete bldg., for Wyandotte School. $260,000. F. W. Liddle, City Hall, city engr.

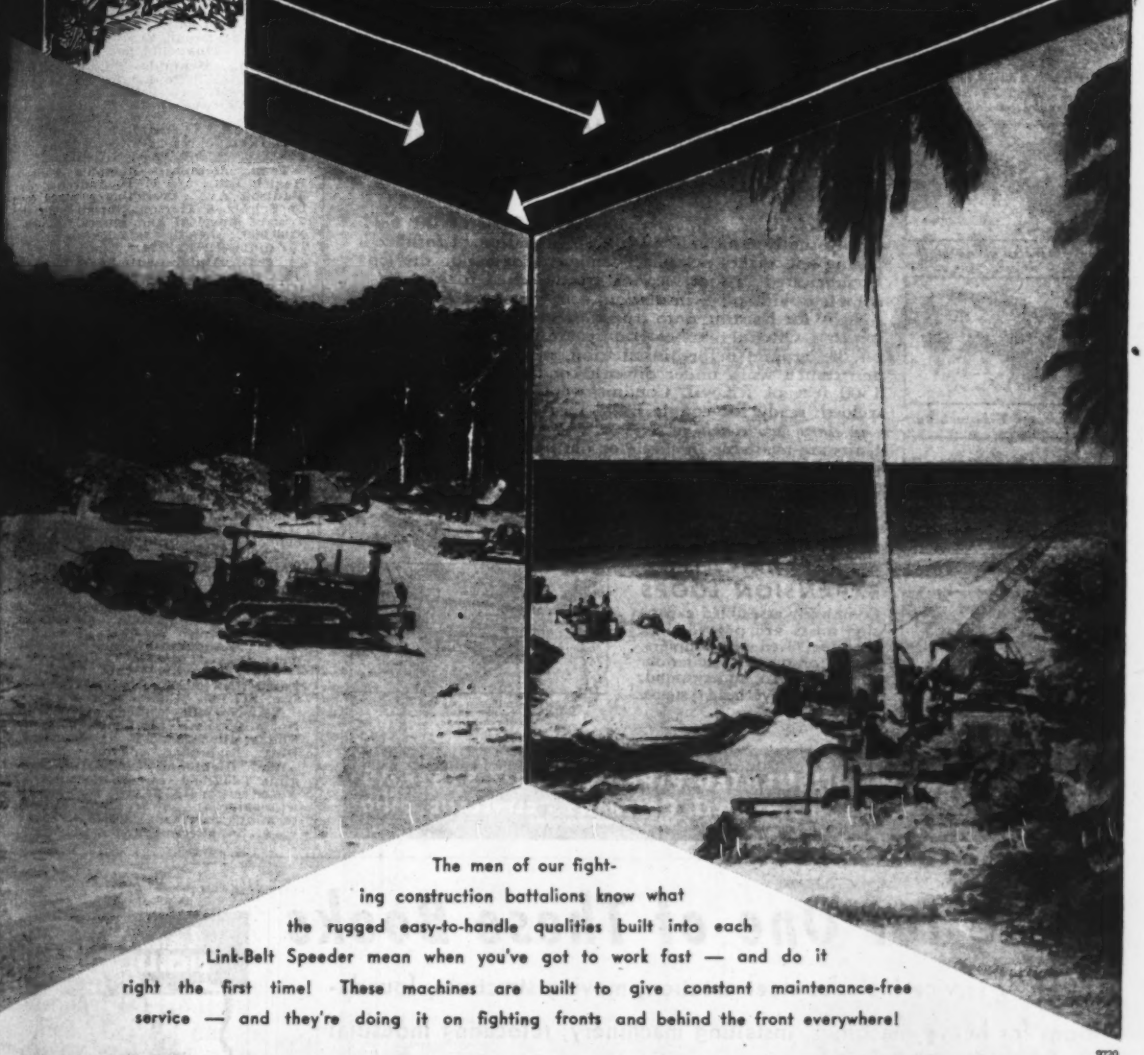
Mich., Wyandotte—City, City Hall, plans under way 2 story, bsmnt., brick, steel, concrete, stone Washington School addn. $240,000. F. W. Liddle, City Hall, city engr.

★**Mo., St. Louis**—City, c/o M. M. Kinsey, pres., Bd. Pub. Serv., 304 City Hall, Zone 3, downtown parking garages with roofs designed to provide landing space for helicopters, erecting two 2,000 ft. raised runways, at Market, Clark, 15 and 17 Sts., and at Delmar Blvd., Franklin Ave., 14 and 15 Sts., $1,000,000 or more. H. Bartholomew, 317 N. 11 St., Zone 1, consult. engr.


NOT Vibration
It's
Viber-ation
for BIGGER Profits
Ordinary vibration won't provide the fast concrete placement that cuts schedule time. VIBER-ation will! 9500 RPM in concrete—3 kinds of power, ruggedness, portability. Switch to
VIBER
Concrete Vibrators
Keep up with latest developments offered by the originators of internal concrete vibration. Write for catalog.
VIBER COMPANY
726 South Flower Street
BURBANK, CALIFORNIA

Look for the Arm-and-Hammer
ARMSTRONG BROS
IDEAL CHAIN TONGS
For Pipe, Fittings and Flanges
The JAWS have straight teeth for pipe, and V shaped teeth for fittings. Drop-forged from special high carbon steel, carefully milled, heat-treated and hardened for toughness and lasting qualities. The HANDLES are forged from spring steel heat-treated to give the required stiffness.
The CHAINS are proof-tested.
Write for catalog C-39a for complete showing and description of Armstrong Bros. Pipe Tools.
ARMSTRONG BROS. TOOL

YOUR LINK-BELT SPEEDER HAS GONE TO WAR ON FRONTS ALL OVER THE WORLD!



The men of our fighting construction battalions know what the rugged easy-to-handle qualities built into each Link-Belt Speeder mean when you've got to work fast — and do it right the first time! These machines are built to give constant maintenance-free service — and they're doing it on fighting fronts and behind the front everywhere!

9720

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.
A DIVISION OF LINK-BELT COMPANY

PREFABRICATED ACCESSORIES
ready to install

Prefabricated elbow unit

Prefabricated T-branch unit

Prefabricated anchor unit

Prefabricated gland seal

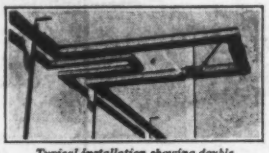
FACTORY PREFABRICATION SAVES TIME AND MONEY ON THE JOB

The Ric-wiL Unit Method eliminates 80% of the field work usually associated with the installation of insulated piping and makes possible phenomenal speed on the job. Prefabricated 21-foot sections are delivered to job site—complete with pipe, insulation, couplings and accessories—ready for hoisting onto trusses or lowering into narrow trenches. Often a number of units are welded and coupled on the ground before installation, minimizing overhead and trench work under difficult conditions. On one job, 1500 feet of Ric-wiL Conduit were installed and pipe welded, ready for couplers and insulation between units *—in only two working days . . .* Ric-wiL Insulated Pipe Units are available in single or multiple pipe systems, for piping steam, hot water, oil or viscous fluids where flow temperature must be maintained.

Write for the new Ric-wiL Catalog

PREFABRICATED EXPANSION LOOPS

Completely assembled expansion units are provided as required, fitted with couplers, ready for quick installation. Adaptable to underground, surface, and overhead systems.



Typical installation showing double overhead expansion loop for steam and return line.

RIC-WIL INSULATED PIPE CONDUIT SYSTEMS
THE RIC-WIL COMPANY · CLEVELAND, OHIO
AGENTS IN PRINCIPAL CITIES

POSTWAR PROJECTS (Cont'd.)

N. M., Hobbs—Bd. Educ., Hobbs, 25 percent completed by Schaeffer & Mc Clovis, high school, incl. mechanical auditorium. $175,000.

★**O., Cleveland**—Div. Light & Power, Crown, dir., City Hall, sketches by Kregelius, city archt., 317 City Hall, ties bldg., maintenance repair shop, St. Yard, $350,000; office bldg., $75 Financing not provided for. CD 12/16/ ENR 12/16/43.

★**O., Cleveland**—Div. Motor Vehicle M tenance, F. Foy, purch. agt., City sketches by H. Kregelius, city archt., City Hall, Ceako Ave. Service Bldg., $16 Leuer Ave. Storage Bldg., $78,750; truck garage and office, $100,$15; tenance bldg., W. 3 St., $290,000. Finan not provided for. CD 12/16/43. 12/16/43.

Okla., Tahlequah—City, R. J. Wi mayor, City Hall, plans by J. H. Hara Muskogee, 2 or more story, bsmat., rein.-con. hospital. $75,000-$150,000. bonds voted.

★**S. C., Charleston**—Bd. School Co Charleston, plans completed by Thomas, 55 Broad St., 2 story school, $500,000; plans completed by Tatum, 34 Broad St., 2 story, brick sch $400,000. Financing not provided for.

★**Tenn., Memphis**—Bd. Educ., E. supt., 317 Poplar St., plans 50% pleted by Regan & Weller, Commerce Bldg., Melrose Junior High School add $275,000; plans 50% completed by bringer & Ehrman, U. P. Bank Treadwell High School addns., $250,000. CD 2/14—ENR 2/24.

Tenn., Memphis—Memphis & Shelby Health Dpt., c/o F. P. Andrews, comr., Madison Ave., preliminary plans compl by Schulz & Horton, Shrine Bldg., 10 7 ward hospital and nurses training sch $360,000. Legal obstacles to be overc CD 2/10—ENR 2/24.

★**Tex., Alpine**—Sul Ross State Teach College, Alpine, plans under way H. P. Smith, National Bank of Comme Pan-American house, $150,000; health ed tion bldg., $150,000; science bldg., $175, power and steam plant unit, $40,000; panded sanitary sewer lines, facilities, $25,000; water facilities expan., over $15,

★**Tex., Houston**—Harris Co., c/o Jud Courthouse, $2,000,000 bond elec Nov. 7, courthouse. H. Zapp, Courthou co. engr.

Tex., Port Lavaca—City, plans 50% c pleted enlarging quick freezing sea plant. $200,000. Garrett Eng. Co., Milam St., Houston, engr.

Tex., Robstown—Bd. Educ., Robst plans 25% underway by E. E. Har 715 S. Tancahua St., Corpus Christi, sch $150,000. CD 8/1—ENR 8/3 under Pub

Tex., Spring Hill—Spring Hill Rural H School Dist., Spring Hill, plans 25% un way by Geo. L. Dahl, So. Life Bldg. Ann Dallas, school. $150,000.

★**Va., Blacksburg**—Virginia Polytech Institute, Blacksburg, student hosp $200,000; engineers' laboratory, $150,0 drilling, testing wells, $20,000; conver power plant, $22,000. Funds allocat F. Q. Saunders, Finance Bldg., Richmo engr.

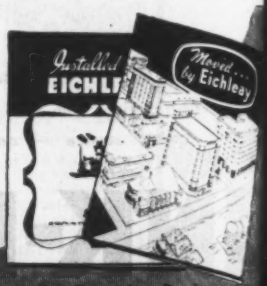
Va., Farmville—State Teachers Colle Farmville, science hall, $175,000; sprink sys., $11,100. Funds appropriated.

Va., Norfolk—College of William & Ma Norfolk Div., academic bldgs. $160,0 Funds allocated. F. Q. Saunders, Finan Bldg., Richmond, engr.

Va., Richmond—Medical College of V ginia, 200-bed nurses dormitory, $300,0 water softeners, $4,000; soot blowers, $2,5 waterpipe to power plant, $1,100; Clay terminus barricade, $2,800. Funds allocat F. A. Saunders, Finance Bldg., engr.

Write for One of These Books

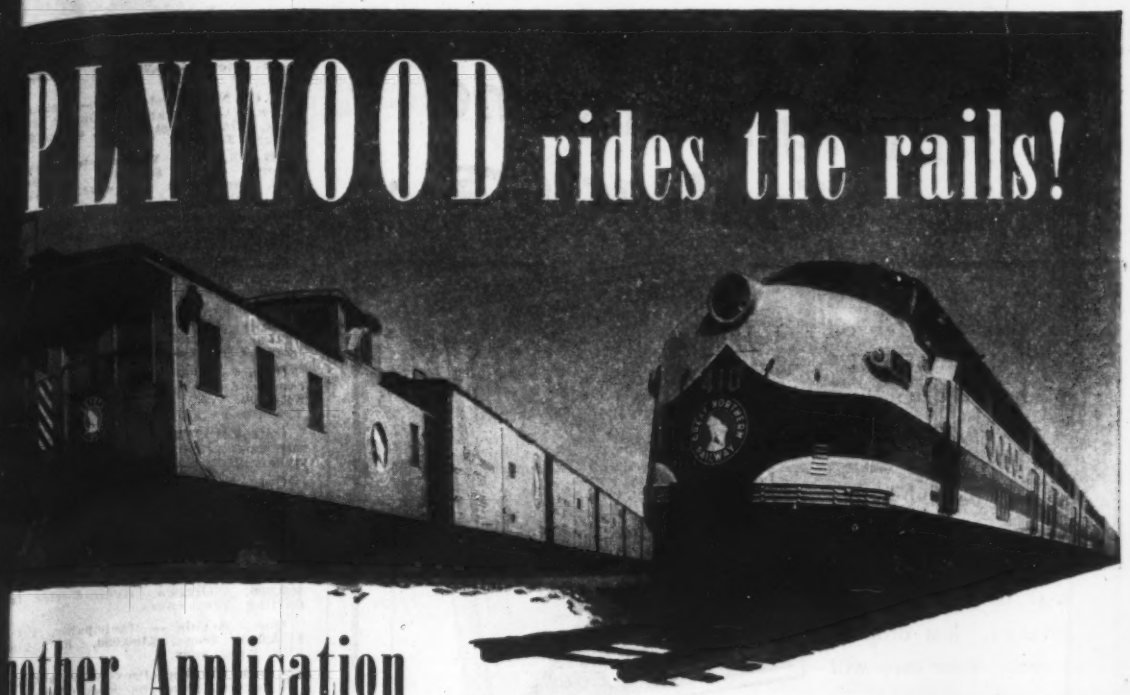
Eichleay service includes steel erection, moving structures, foundations for heavy machines, installing machinery, relocating industrial units, and related projects. Frequently while foundations are being constructed machinery is erected and then moved to location, thus saving much "down time."



Two New Books
1. Installed by Eichleay
2. Moved by Eichleay

EICHLEAY, 33 S. 19th Street, Pittsburgh 3, Pa.

PLYWOOD rides the rails!



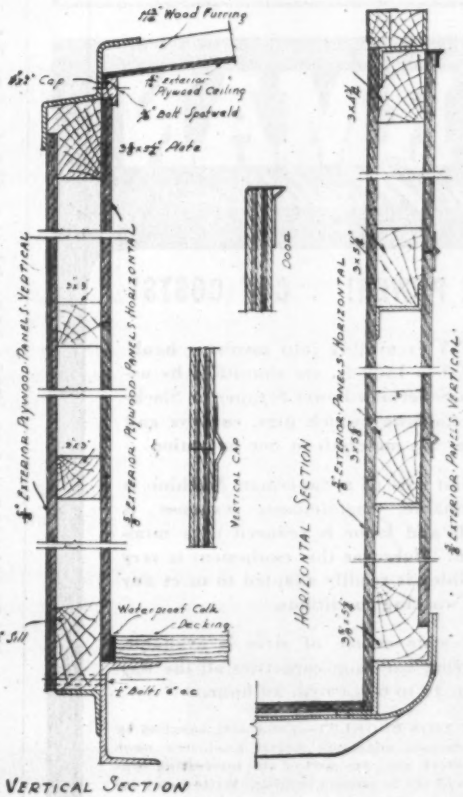
nother Application
proving the Durability of Douglas Fir Plywood

y railroad car builders e used durable Douglas fir wood for the ceiling and de lining of freight cars, oses and baggage cars— for complete refrigerator

Great Northern Railway e latest to select Douglas plywood to do a really h job. A schedule of 1,000 ars, built at the Great thern's St. Cloud shops, zed plywood for all out- and inside sheathing, in- ing the ceiling.

rior type Douglas fir ply- d (made with permanent- aterproofed binder) was throughout the new cars. ide panels, installed ver- y, are 5/8" thick. Inside ls, installed horizontally, /8" thick. Ceiling panels of 5/16" plywood. De- d structural sections are n at the right.

plywood cars, built with al steel frame and wheel ages, average two tons



lighter than conventional cars. Production schedules called for the completion of six per day. The fact that Douglas fir plywood proves itself ideally suited to such rigorous service demonstrates again that this "miracle wood" is one of your most versatile building materials for every type of structural use. Douglas Fir Plywood Association engineers will gladly answer any query concerning plywood's application to construction work of any kind.

Douglas fir plywood is now available only on highest priorities. Application for allocation must be made by suppliers to the War Production Board.

DOUGLAS FIR PLYWOOD
LARGE. LIGHT. STRONG.
Real Wood PANELS

GLAS FIR PLYWOOD ASSOCIATION, Tacoma 2, Washington

Of Interest to Engineers and Contractors . . .

is this booklet on "COMMERCIAL" Methods of Tunneling. Every engineer interested in tunnel design should have it — and every engineer interested in tunnel design may have it free of charge. Just drop us a card. Your copy will be sent immediately.

COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN 1, OHIO

SAUERMAN
Long Range Machines

SAVE LABOR! SAVE POWER! CUT COSTS!

Above picture shows a 3 cu. yd. Sauerman Scraper with its power unit mounted on a skid-frame, as used to build a gravel revetment on a long section of eroded river-bank. The scraper dug gravel from a bar in mid-stream and placed this material in a sloping fill at the rate of 130 cu. yd. an hour and at a total cost of a few cents per yard handled.

MANY excavating jobs involving hauls of 100 to 1500 ft. are simplified by using a Sauerman Power Scraper or Slackline Cableway which digs, conveys and places the materials in one operation.

First cost of a Sauerman Machine is reasonable, maintenance expense is small and labor is reduced to a minimum. Moreover this equipment is very flexible; is readily adapted to meet any new working conditions.

A wide choice of sizes is available, offering handling capacities all the way from 10 to 600 cu.yd. an hour.

GET THIS BOOKLET—Field data supplied by contractors, engineers, gravel producers, mine operators, etc., are part of the interesting contents of the Sauerman catalog. Write today for your copy of this useful book.

SAUERMAN BROS., Inc., 532 S. Clinton St., CHICAGO 7

POSTWAR PROJECTS (Cont'd.)

B. C., Nelson—Municipality, new city fire hall and warehouse, $150,000; plant exten., $135,000. S. H. Dawson, engr.

B. C., New Westminster—Dominion Ottawa, Ont., plans by Dpt. P. Wks., tawa, Ont., post office exten., armory, $200,000.

★**B. C., New Westminster**—Municipal civic centre, $500,000. A. Hunter, Hall, works supt. and engr. CD 10/5.

Man., Winnipeg—Province of Manit Winnipeg, plans ministry of Health, W peg, Central School for Deaf, $200,000. P. Wks., Winnipeg, engr.

New Brunswick—Dominion Govt., Ott Ont., nitrogen plant, $350,000. Dpt. P. Ottawa, Ont., engrs.

N. B., Saint John—Municipality, new exten. at southern end of St. John Vocati School, $225,000. D. R. Smith, City engr. CD 4/3—ENR 4/20.

Ont., Cornwall—City, J. G. Cameron, combined city hall, fire hall and market $250,000. M. G. Wilson, 128 Gen Toronto, engr.

Ont., Fort William—Municipality, mech cal repair shop, etc., $75,000. H. M. W house, City Hall, engr.

Ont., Fort William—Municipality, ge hospital, $350,000. H. M. Woodhouse, Hall, engr. CD 1/24—ENR 2/10.

Ont., New Liskeard—Municipality, mu pal bldg. and hospital, $150,000. H. Sutcliffe, Town Hall, engr.

Ont., Ottawa—Municipality, sub-sta $90,000. Ottawa Hydro-Electric Co Carling Ave., engrs.

Que., Arvida — Municipality, city $125,000; arena, $100,000. R. A. Lem City Hall, engr.

★**Sask., Regina**—Province of Saskatche Regina, plans by Saskatchewan Ha Service Comn., Regina, medical bldg. University of Saskatchewan, $300,000. **READY FOR BIDS**

★**Ill., Salem** — School Dist. 600, Sa plans completed by Smith, Krat Strong, Urbana, brick, community school, concrete fdn., built in 4 units, auditorium, gymnasium, shop and cafe and 3 story academic bldg., $1,000,000.

COMMERCIAL BUILDING

PROPOSED WORK

Conn., West Hartford—Brooklawn, 304 Edgewood St., 2 story, brick garden apartment, also community stores, Farm ton Ave. and Front Brook Drive, $175,

★**Mo., St. Louis**—William S. Broada Co., 4006 Chouteau Ave., Zone 11, x375 ft., rein. con. brick, stone apartm on site at Magnolia and Tower Groves A $950,000.

★**Mo., St. Louis**—St. Louis Archdiocese the Catholic Church, c/o Archbishop Glennon, 4901 Lindell Blvd., Zone 8, 2 re con., brick, stone high schools for gi and one such for Negroes, $300,000-$40 each.

N. Y., Bronxville — Concordia Colleg Lutheran Institute, Bronxville, educati bldg., $280,00-. Fund raising campaign derway.

N. Y., New York—Bickfords, Inc., 311 50 ft., Zone 19, general office bldg., ba and commissary, 607-619 W. 45 St. $150,000.

O., Cleveland — Euclid Congregati Church, Rev. J. Hockstatter, pastor, E. 224 St., stone or brick, steel, conc church, $150,000.

★**Okla., Tulsa**—University of Tulsa, College St., downtown college bl $150,000; administration bldg., $325,000; ness administration bldg., $175,000; nasium and field equip. house, $100, petroleum science bldg., $150,000; m do mitory $350,000; fire-proof women's dor tory, $350,000; core analysis and co bldg., $175,000; auditorium, $150,000; b economics and students activities bl $200,000; water supply lines and facil over $25,000; install. sanitary sewers, $45,000; natural gas and synthetics bl $150,000.

★**Pa., Harrisburg** — Harrisburg Jo Chamber of Commerce, c/o C. R. Stah pres., arts bldg. to be used as art m auditorium $500,000-$800,000.

Pa., Lebanon — Lebanon Valley Col Lebanon, physical education bldg., $

Pa., Lock Haven—Young Men's Chri Assn., Lock Haven, 2 story, basmt. house, $200,000. Campaign for fun finance now in progress.

★**Pa., Phila.**—Horn & Hardart Baking 208 S. Warnock St., restaurant, S. Broad St., $300,000-$350,000; Site chased; restaurant, 5 and Market $500,000.

municipalities throughout the country are making post-war plans for improvements or ions in their water systems. STREAMLINE copipe connected with STREAMLINE solder type fitprovides the most practical installation for water e lines . . . for all general plumbing and heating oses, and for many applications in filtration plants.

together, STREAMLINE copper pipe and STREAMLINE r fittings are an unbeatable pair.

AMLINE copper pipe when assembled in the STREAMLINE rests upon an internal shoulder of practically the same t as the thickness of the pipe wall, thus forming a continusmooth waterway which offers no anchorage points for the ng up of foreign matter in the water.

VIBRATION PROOF

AMLINE copper pipe connected with STREAMLINE solder fittings is rom the harmful effects of vibration. Vibration is not localized at the as it is with threaded or flared fittings, but is harmlessly dissipated ghout the service line.

SETTLEMENT AND FROST ACTION

AMLINE copper service pipe is so ductile that it will stretch enough to easily care of any settlement of filled earth, or, in fact, anything that might impose a strain on the service line which would cause failure of rigid ferrous pipe or, at the very least, cause leakage at the threaded connections.

In the Northern States and in the Dominion of Canada, copper service pipe of our manufacture has an outstanding advantage that places it far in advance of any other service material. This advantage is its resistance to frost action. This service pipe containing water under almost any range of pressure used in water service work can be alternately frozen and thawed out for a considerable number of times without showing any effect except a slight increase in diameter.

INVESTMENT INSURANCE

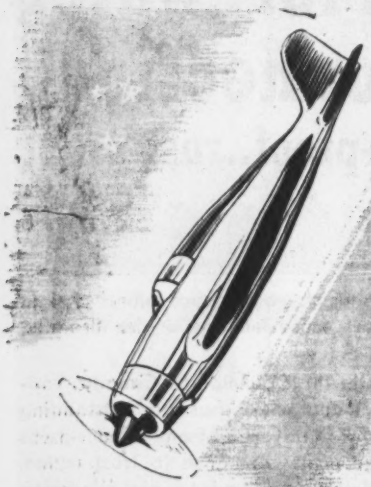
STREAMLINE copper pipe and fittings are at present being used 100% for war purposes in naval craft of practically all kinds, but it is not too early to plan again for their peacetime use. Waterworks officials who are responsible for the return on a heavy capital investment will find STREAMLINE materials one of the lowest cost forms of insurance that they can adopt.

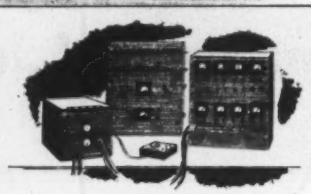
STREAMLINE
PIPE AND FITTINGS DIVISION
MUELLER BRASS CO.
PORT HURON, MICHIGAN

At 700 miles an hour — ANYTHING CAN HAPPEN!

Hurtling earthward at speeds greater than 700 miles per hour, the test pilot is purposely torturing his plane to the limit of its endurance. Riding as observer on many test flights, Consolidated Vibration and Strain Measuring equipment functions with unfailing accuracy to check the results of this punishment.

Probing the very structure of the plane, searching out unwanted and damaging strains and vibrations, these compact, lightweight instruments automatically record their findings. This record, in the hands of qualified engineers, aids in the ultimate design and manufacture of finer aircraft for war and peace.





Air power for war has urgently required the greatest share of these sensitive accurate instruments. However, the war's end will find us ready to apply this equipment to the structural and mechanical engineering problems of peacetime manufacturing.

Consolidated's engineers are naturally interested in your ideas and problems. Please address inquiries to Dept. 10-E, 595 East Colorado Street, Pasadena, California.

ARMY-NAVY E WAR-NAVY

"INSTRUMENTS FOR INDUSTRY IN WAR OR PEACE"

CONSOLIDATED ENGINEERING CORPORATION

Herbert Hoover Jr. President

POSTWAR PROJECTS (Cont'd.)

★**Pa., Phila.**—Hyman Korman, Inc., Castor Ave., 100 residences, northeast sect. $600,000. Site purchased.

★**Pa., Phila.**—C. Metz, 5014 Ogontz Ave., 100 residences, West Oak Lane, Stenton Sect. $650,000. Site purchased.

★**Pa., Phila.**—F. W. Woolworth Co., 1216 Broad St., 3 story store and office, 1336 Chestnut St. $600,000-$1,000,000. Site purchased.

Tex., Denison—First Baptist Church Congregation, Denison, fireproof church. $150,000.

Tex., San Antonio—O. C. Uhl, 119 Martin St., 4 to 6 story apartment, Main and Augusta Sts. Over $150,000. Site purchased.

★**Tex., San Antonio**—International Memorial House, Mrs. A. Adams, 146 Agarita St., bldg., incl. swimming pool, 6 courts, auditorium, etc. $7,500,000.

Wis., Milwaukee—Capitol Drive Lutheran Church, 381 N. 52 St., church. $200,000.

B. C., Victoria—Bank of Toronto, 55 King St., Toronto, Ont., bank, Yates St. $200,000.

B. C., Victoria—Imperial Bank of Canada, 51 W. King St., Toronto, Ont., bank, Yates St. $150,000.

N. S., Halifax—Roman Catholic Archdiocese of Halifax, c/o Archbishop J. McNally, home for aged and indigent. $150,000.

N. S., Halifax—Odeon Theatres, Ltd., Casino Theatre, Gottingen St., theatre, Queen St. and Spring Garden Rd. $150,000. Site purchased.

Ont., Ottawa—Jewish Community, c/o A. Betcherman, 7 Beechwood Ave., Eastview, community centre. $400,000.

Ont., Ottawa—The Perley Home for Incurables, D. Robertson, treas., 14 Aylmer Ave., hospital exten. $150,000.

Ont., Ottawa—Reverend Sisters of The Grey Nuns of the Cross, 21 Cambridge Ave., hospital exten. $200,000.

PLANS UNDER WAY

Conn., Stamford—F. W. Woolworth Co., 220 Atlantic St., Stamford, plans underway, brick, steel store bldg., Atlantic St. $150,000.

★**La., New Orleans**—New Orleans Opera House Assn., 520 Royal St., plans by L. A. Benson, Canal Bldg., concrete, granite and structural steel replica of the Old French Opera House, $1,500,000. Geo. J. Riehl, Canal Bldg., assoc. archt.

Mo., St. Louis—Hampton Realty Co., c/o L. J. Ansell, 3616 Olive St., Zone 8, preliminary sketches by L. F. Abrams, 1216 Delmar Blvd., Zone 3, motion picture theatre, Hampton Ave. $200,000. Site purchased.

Nev., Reno—Reno Securities Co., Riverside Hotel, plans underway by De Longchamps & O'Brien, 760 Market St., San Francisco, Calif., and Gazette Bldg., Reno, 3 story rein.-con., steel Riverside Hotel addn., 17 S. Virginia St., $350,000.

★**N. Y., Rye**—Airway Homes, Inc., D. Van Dam, pres., 39 Bway., New York, Zone 6, plans underway 650 homes on 200 acre site fronting Westchester Ave. and Ridge St. $5,000,000. FHA.

★**N. C., High Point**—High Point Memorial Hospital, R. T. Amos, chr. Bldg. Comm., plans underway by Chas. C. Hartman, Jefferson Bldg., Greensboro, modern hospital to be located on present Burrus Memorial Hospital site, $750,000. CD 1/21—ENR 2/10 under Public Bldgs.

★**Tenn., Memphis** — Southwestern University, North Parkway, plans by H. Hibbs, Trust Bldg., Nashville, college bldg., $500,000. CD 2/10—ENR 2/24.

Tex., Austin—Holy Cross Hospital, 1112 Concho St., plans by C. H. Page & Brother, consult. archt., Gracy Bldg., brick, reinf. con. hospital. $150,000.

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearing and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

McCAFFREY-RUDDOCK TAGLINE CORP.

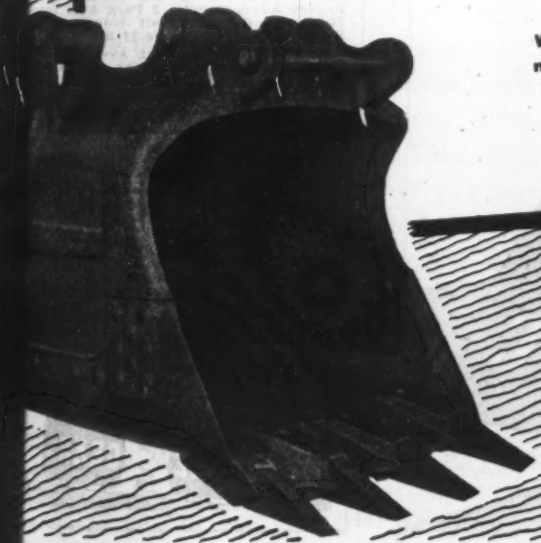
2121 E. 25TH ST. LOS ANGELES 11, CALIF.

TRACTOR & MCHRY. CO. Atlanta, Ga. | A. H. COX & CO. Seattle | FORSYTHE EQUIP. CO. Long Island City, L. I. | CONLEY EQUIP. CO. Philadelphia, Pa. | W. E. PHILLIPS Detroit, Mich. | L. L. HANSON Chicago, Ill. | OWEN BUCKET CO. LTD. Berkeley, Calif.

Production line manufacturing of PMCO **WELDED DIPPERS** *effects economies in fabrication*

Volume production means manufacturing economies that give bigger values to users. The wide acceptance of the weight saving and added strength features of PMCO Welded Dippers throughout the power shovel field enables us to make better dippers on an economical cost basis.

Other features that give added values are refinements in design such as wide set teeth at extreme outer corners of the lip that reduce digging resistance—one-piece, full length manganese steel front (12% to 14% manganese) with strength to support wide set teeth—tapered sides and back that assure faster dumping—wide spaced hinges set ahead for greater strength and easy closing of door — tapered socket type teeth, easily replaceable and the improved latch mechanism are but a few of many new developments incorporated in the modernized PMCO Welded Dippers.



We operate the largest and most complete manganese steel foundry in the United States

PMCO

PETTIBONE MULLIKEN CORPORATION

Established 1880

4700 West Division St.
Chicago 51, Illinois

WHERE DO YOU DRAW THE *line* — Pipe Application — ?

Why

in the name of good engineering is the line so often sharply drawn between the alleged "special" field of application for Taylor Spiral Pipe and the field for conventional Standard Thickness pipe?

Many of the applications for Taylor Spiral Pipe are well recognized. In long water lines across rough country, for example, its great strength, light weight and low cost make Taylor Spiral the ideal pipe. But simply because it is such a "natural" for special services is certainly no reason to pass up its economy in the wide range of everyday piping applications—the moderate and low pressure lines for which Standard Thickness pipe is too often chosen.

Remember that the combination of rugged strength and light weight you know so well in special applications often enables Taylor Spiral Pipe to handle the ordinary run of piping services at an installed cost of no more than half that of conventional Standard Thickness pipe.

For all piping needs—not just the "special" needs—take Taylor Spiral Pipe into your calculations. It will open up some worthwhile savings for you.

TAYLOR FORGE & PIPE WORKS
General Offices & Works: Chicago, P.O. Box 485
New York Office: 50 Church St.
Philadelphia Office: Broad Street Station Bldg.

POSTWAR PROJECTS (Cont'd.)

Tex., Houston—Q eene of Peace Chur 3100 Blk. Telephone Rd., Houston, pl 10% completed by T. G. McHale and G A. Fuller Co., Laporte Rd., church edu tional bldg., rectory. $150,000.

Tex., Orange—St. Marks Methodist Chur S. Blackburn pastor, Orange, plans completed by B Irby, Beaumont, 1 church, gothic architecture, Park Ave. 16 St $150,000.

Tex., San Antonio—Travis Park Metho Church, Navarro and Travis Sts., plans H. Steinbomer, 912 Travis Bldg., 3 ba bamnt., roof garden, air-conditioned edu tion bldg., and altering stone main chu bldg. $150,000. CD 2/24—ENR 3/9.

★**Tex., Sequin—Texas** Lutheran Colle Sequin, plans 5% completed by A. B. R. M Ayres, Transit Tower Bldg., S Antonio brick rein.-con steel chapel, $1 000; Union Bldg., $150,000; dormitory, $1 000; library, $150,000; gymnasium, $40,0 power plant, $40,000; grandstand and athle grounds development, $25,000.

★**Va., Richmond**—Thalhimers Dpt. Sto 6 and Grace Sts., plans underway Carneal, Johnston and Wright, Atlantic L Bldg., 6 story addn., to 1 story section store and overhead bridge connecting store warehouse, est. $1,600,000. O. P. Wrig consult. archt.

Wis., Columbus—7th Day Adventists, E. Gorham St., Madison, plans by Chas. Nicol & Associates, 59 E. Van Buren St Chicago, Ill., school incl. boys dormitor girls dormitory, administration plant, hea ing plant, book bindery, vocation bldg., gy nasium.

Ont., Cornwall—Palace Amusement Co Ltd., Royal Bank Bldg., Toronto, plans M. Brown, Confederation Bldg., Toron structural steel, brick theatre, concrete fo Pitt St. $150,000.

Que., Montreal—Owner, c/o R. Duma archt., 3995 Sherbrooke St. E., 26 suite, story, 72x108 ft. apartment block. $150,0

READY FOR BIDS

N. Y., New York—L. E. Bernson, 2390 T bout Ave., Zone 57, plans completed I. L. Crausman, 332 E. 149 St., Zone 51, story, 84x150 ft. apartment bldg., Briggs Ave., near 197 St., $250,000.

N. Y., New York—Cannon Constr. Co., 1 Fifth Ave., Zone 17, plans completed G. G. Miller 67 W. 44 St., Zone 18, 6 sto apartment, 136 Seventh Ave. $250,000.

★**N. Y., New York**—W. P. Chrysler Bld Corp., Chrysler Bldg., Zone 17, plan completed by Reinhard & Hofmeister, Rockefeller Plaza, Zone 20, 35 story off bldg., 142-56 E. 43 St. $3,000,000. CD 1/ ENR 9/21.

★**N. Y., New York**—City Investing Co., Broad St., Zone 4, plans completed Eggers & Higgins, 542 5th Ave., Zone 12 story apartment, 4 E. 89 St. $500,0 CD 5/9—ENR 5/18.

N. Y., New York—City Investing Co., Broad St. Zone 4, plans completed by H. Prince, 101 Park Ave., Zone 17, 15 sto office and store bldg., 265 Madison Ave $350,000.

★**N. Y. New York**—88 Corp., L. S. Kande pres., 4140 Bway., Zone 33, plans com pleted by H. Ginsbern, 205 E. 42 St., Zone 1 13 story 100x150 ft. apartment, 551-5 Amsterdam Ave. $625,000; 10 story, 100x1 ft. apartment, 589-595 Amsterdam Ave $500,000

★**N. Y., New York**—Emigrant Industri Savings Bank, 51 Chambers St., Zone plans completed by Ely Jacques Kahn Robert Adam Jacobs, 2 Park Ave., Zone 1 23 story office and loft bldg., at 1184 Bway., northeast corner 28 St., $1,200,000.

N. Y., New York—Fifth Ave. Bank of Ne York, 530 Fifth Ave., Zone 19, plans com pleted by H. G. Webb, c/o owner, 8 sto bank addn., 530 Fifth Ave. $399,550.

CUSTOM BUILT **GEARS** of all Types and Sizes

For more than forty years we have specialized in cutting spur, bevel, spiral, and worm gears in all practical materials and sizes from ½" to 30 ft. in diameter.

THE EARLE GEAR & MACHINE CO.
4717 Stenton Ave., Philadelphia, Penna.

EARLE GEARS

KEEPING 'EM BUSY

re are two things about this picture to warm the hearts of mining-. One is the sight of an important mine in full war production. The r is the sight of husky Mack trucks doing their part to keep every el working "all out." Each of these Macks, with their 30-ton load city, can move 2,160 tons of earth every 24 hours! No wonder mine ators depend so much on Mack. They know its bed-rock toughness, own-to-earth operating economy—and its 44-year-old reputation eing *more* truck, ready and able to take more punishment, and do work. They know from experience what "Built like a Mack" ns . . . and what a satisfaction it is to have Macks on the job.

Mack Trucks, Inc., Empire State Building, New York, N. Y.
Factories at Allentown, Pa.; Plainfield, N. J.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

RAPIDITY!

UNIFORMITY!

SATISFACTORY!

Contraction joints MUST or should be installed within the "opportune" limited time of ten minutes; this requires speed and proper machinery. All Engineers know how disastrous it is to work concrete too wet or too dry.

"FLEX-PLANE" mechanical joint installers for all types of joints—ribbon, premoulded, poured, cork, rubber, etc.

Ask for Bulletin E-11; it "portrays" other things you know!

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO

POSTWAR PROJECTS (Cont'd.)

N. Y., New York—G. & W. Bldg., Corp., 415 Lexington Ave., Zone 17, plans completed by H. I. Feldman, 415 Lexington Ave., Zone 17, 8 story apartment, Grand Concourse and Kingsbridge Rd. **$200,000.**

N. Y., New York—Pannonia Realty Co., Inc., W. Palmer, pres., 240 Madison Ave., Zone 16, plans completed by A. Weiser, 240 Madison Ave., Zone 16, 10 story, penthouse apartment, 32-36 E. 65 St. **$280,000.**

N. Y., New York—Parkway Development Corp., 315 E. 196 St., Zone 58, plans completed by I. L. Crausman, 332 E. 149 St., Zone 51, **$160,000.**

N. Y., New York—Roman Catholic Archdiocese of New York, 477 Madison Ave., Zone 22, plans completed by Eggers & Higgins, 542 Fifth Ave., Zone 19, Our Lady of Victory Roman Catholic Church, Pine and Williams Sts. **$430,000.** Wilcox & Erickson, 11 E. 44 St., Zone 17, consult. engr. C. 7/28—ENR 8/10.

N. Y., New York—312 W. 22 St. Corp., c/o L. Stillman, archt., 705 Gerard Ave., Zone 51, plans completed 6 story apartment, 60-86 Park Terrace East. **$325,000.**

N. Y., New York—University Development Corp., 315 E. 196 St., Zone 58, plans completed by I. L. Crausman, 332 E. 149 St., Zone 51, 6 story 84x125 ft., apartment, University Ave., near 183 St. **$210,000.**

★**N. Y., Scarsdale**—Mrs. Miller McClintock, c/o Leonard Schultze & Assoc., architects, 18 E. 48 St., New York, Zone 17, plans completed, 44 bldgs. apartment development on 26 acre site, **$3,000,000.**

CONTRACTS AWARDED

N. Y., Celoron—Celoron Realty Co., H. A. Illions, pres., forty 5 room frame dwellings, to **Erickson Bros.**, Dearborn St., Jamestown, **$150,000.**

INDUSTRIAL BUILDINGS

PROPOSED WORK

Me., South Portland—WAREHOUSE—M. Simon, 84 Vincent St., 3 story, 50x90 ft., brick warehouse B St., **$50,000.**

★**Md., Baltimore**—FACTORY—Proctor & Gamble Co., 1000 Nicholson St., sketches, alterations, addns. factory bldgs. **$1,000,000.**

Tenn., Memphis—PLANT—Rotary Lift Co., H. Allen, vice-pres., 1054 Kansas St., construct plant addns., and re-arrangement of mfg. facilities, **$90,000.**

Tex., Houston—WAREHOUSES—D. Weil, 2107 McKinley St., three 1 story, 64x256 ft., concrete warehouses. Over **$100,000.**

Tex., La Porte—PLANT—E. I. DuPont de Nemours & Co., duPont Bldg., Wilmington, Del., and 2219 McKinney St., Houston, Tex., construct., equip. plant to mfg. phenothiazine chemical on 822 acre site purchased on San Jacinto Bay, over **$150,000.**

Tex., San Antonio—GARAGE—O. C. Chandler, 119 E. Martin St., mechanical garage and shop bldg., Martin and Augusta Sts. Over **$40,000.** Site purchased.

★**B. C., Powell River**—PLANT—Powell River Co., Ltd., Powell River, board plant and shingle and kraft mill. Over **$1,000,000.**

Man., Wekusko—MILL—Howe Sound Ltd., Wekusko, mill construction. **$100,000.**

Que., Dolbeau—PLANT—Lake St. John Power & Paper Co., Ltd., Dolbeau, plant expan. to more than double present capacity.

Que., Quebec City — PLANT — Merry-Mac Shoe Co., Reg'd., 11 Dorchester St., shoe mfg. plant, etc., **$40,000.**

PLANS UNDER WAY

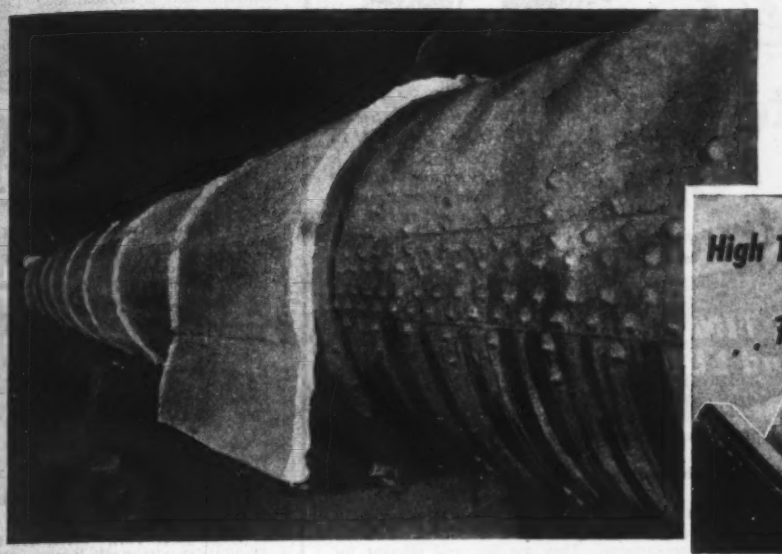
★**Minn., St. Paul**—PLANT—American Can Co., 747 Prior Ave. N., 1 story, brick steel plant, office, machine shop, warehouse on 49 acre site, Como Ave., Fifield and Packart Sts. and Northern Pacific R. R., **$6,500,000.** C. Preis, 430 Park Ave., New York, N. Y., ch. engr.

EPPINGER AND RUSSELL CO.
Wood Preservers Since 1878
All Kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or
DU PONT CZC Chromated Zinc Chloride
80 EIGHTH AVE., NEW YORK, N. Y.
POLES, CROSS ARMS, PILING, TIES, POSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla. Norfolk, Va.
Long Island City, N. Y.

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS
Write for descriptive catalogs
McKIERNAN-TERRY CORP.
13 Park Row, New York

BAILEY METERS AND CONTROLLERS
FOR SEWAGE TREATMENT AND WATER SUPPLY . . .
● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.
BAILEY METER COMPANY
1088 IVANHOE ROAD ● CLEVELAND, O.
Bailey Meter Co. Ltd., Montreal, Canada

★retort insulation



. . another job for

FIBERGLAS* METAL MESH BLANKETS

The high thermal efficiency of Fiberglas Insulating Wool is only one of its many advantages as blanket insulation for retorts, boilers, tanks, industrial ovens, large ducts and breechings.

Blankets of Fiberglas Insulating Wool may be had with *mesh facing on one side only!* The fine, long fibers, of which this material is made, interlace to form an insulation that has "body", that holds itself together. This unique and desirable feature is especially advantageous when vessels to be covered have laps, rivets and other projections.

Fiberglas Metal Mesh Blankets are light in weight. They do not disintegrate with handling. Their fluffy edges form a tight seal when the blankets are laced together. And they can be cut to any desired shape to provide a complete seal around valves, pipes and fittings. As a result, they are applied easily, quickly and economically. Many users have enjoyed further savings through re-use.

Fiberglas Metal Mesh Blankets are available with three standard facing materials: hexagonal wire, expanded metal lath and rib lath. These facings provide a suitable base for any type of indoor or outdoor finish. And they are supplied in two types—*No. 600* for temperatures up to 600° F.; *No. 900* for temperatures up to 1000° F. For more information about this or other forms of Fiberglas Industrial Insulations, write for booklet, "Fiberglas Insulations for Industry". *Owens-Corning Fiberglas Corporation, 1840 Nicholas Building, Toledo 1, Ohio. In Canada, Fiberglas Canada Ltd., Oshawa, Ontario.*

Co-operation with the government program to save critical fuel.

OTHER FIBERGLAS INSULATIONS

1. PF Pipe Insulation—A lightweight, pre-formed pipe covering with high insulating efficiency for temperatures up to 600° F. Made in 3-ft. sections or segments for all standard pipe sizes. Fibrous ends of sections intermesh to form tight joints.

2. Blanket Type Pipe Insulation—With mesh wire on outer side to wrap around pipe and secure with wire through special edging. Manufactured in 2-ft. sections for pipes over 3" O.D. Will withstand temperatures up to 1000° F.

3. No. 600 PF Block—Same materials as in PF Pipe Covering—in blocks 6" x 36" and 12" x 36", standard thicknesses.

4. OC-1800 High Temperature Block—A highly efficient and rugged molded block in sizes 6" x 36" and 12" x 36"—in standard thicknesses. Will withstand surface temperatures up to 1800° F.

5. Insulating Cement—For insulating fittings, valves and all irregular surfaces. Highly efficient . . . withstands temperatures up to 1200° Fahrenheit.

6. OC Mastic—An asphalt emulsion cement for insulated pipe and equipment exposed to outdoor or high moisture conditions.

7. TW-F Wool—Fabricated in bats, rolls and bulk. Used for drying-ovens, heaters, etc., for filling irregular spaces and for fireproofing.

8. PF Board—Manufactured in 5 densities from 2½ to 9 lbs. per cu. ft.—standard sizes 24" x 48", 1" to 4" in thickness. For insulated panels, sound absorption and various structural applications.

9. PF Roof Deck Insulation—9 lb. density with facing to facilitate mopping. Highly efficient, fireproof, rotproof and moisture-resistant board, for application under industrial built-up roofings. Sizes 24" x 48". Thicknesses from 3/16" to 2".

To help you make the proper selection, a "Fuel Savings Calculator" is available for determining heat loss, fuel savings and other factors. Write us for one.

ARMY E NAVY

FIBERGLAS

*Trade Mark Reg. U. S. Pat. Off.

INDUSTRIAL INSULATIONS

Buy War Bonds

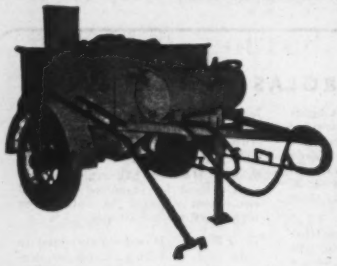
Write for literature on MALL SAWS, MALL Gasoline Powered and Pneumatic Chain Saws in 24", 36" and 48" sizes, Gasoline Powered, Electric and Pneumatic Concrete Vibrators, Electric Surface Planes and Drills.

MALLSAWS "pay-off" on all types of concrete form construction above and below grade by:
REDUCING SAWING TIME—due to high speed and power—plus multiple cutting of like members at one time.
ASSURING SQUARE BOARD ENDS—that eliminate fins and projections.
SALVAGING WASTE LUMBER for spreaders, stoppers and bracers.
MALLSAWS are powered beyond ordinary requirements. They are fast and efficient for cross-cutting, ripping, beveling, pocket cutting and other sawing jobs. MALLSAWS also cut metal, cut and score concrete, tile, and stone with an abrasive wheel. They are perfectly balanced for use with either hand. Safety guard on all models.

MALL TOOL COMPANY, 7730 So. Chicago Ave., Chicago 19, Ill.

*Ask Your Dealer for Electric MALLSAWS Today

Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**



HEATING KETTLES
FOR ASPHALT AND TAR
Fire Proof—Oil Burning
Hand and Motor Driven Spray

Other Products

CONCRETE VIBRATORS
Gasoline Engine and Electric Motor Driven Models

FRONT END SHOVELS
for Industrial Tractors

AGGREGATE DRYERS
for Stone and Sand

ASPHALT PLANTS
Portable — Stationary

Write for Circulars

White Mfg. Co.
ELKHART INDIANA

Compact! Powerful! Safe!

DISTRIBUTABLE CONTROLLED POWER
with
Beebe Bros. ALL STEEL HAND HOIST
SEATTLE, U.S.A.

Money Has Been Saved on These Jobs
1200' assembled pipe (132 Tons) were lowered to bed of Mississippi at St. Paul with 9—5-Ton Beebes, three lines to each hoist through blocks.
Hudson River Bridge sidewalks were laid in sections with 32—5-Ton Beebes.
Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

★

When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

BEEBE BROS., 2720 6th Ave. S., Seattle 4, U. S.

★

"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"

POSTWAR PROJECTS (Cont'd.)

O., Cincinnati—PLANT—Grand Pop Bottling Co., 810 W. 5 St., plans by Carl J. Kiefer Assoc., Inc., engr. and archt., E. 6 St., 2 story, 50x75 ft., brick, concrete bottling plant. $150,000.

Okla., Oklahoma City—MACHINE SHOP—Black Silvalls & Bryson, Inc., 2131 Westwood St., plans 50% completed addn. to existing machine shop and fabrication assembly for purpose of making welded vessels and oil field specialties, $60,000. G. Raymond, engr. Legal obstacles to be overcome.

R. I., Providence—PLANT—Coro, Inc., E. B. Perry, 167 Point St., plans by Harker & Turoff, 1022 Grosvenor Bldg., brick plant bldg., addn. Over $150,000.

Tenn., Memphis—PLANT, etc.—Abraham Bros., G. G. Abraham, vice pres., Hollywood Sts., plans by H. P. Henschien, 59 E. Van Buren St., Chicago, Ill., plant and offices, $250,000. H. Hunter, 1966 Tutwiller St., consult. engr.

Tex., San Antonio—WAREHOUSE—Jenner Mfg. Co., 32' S. Flores St., plans underway by H. S. Steinbomer, 502 Funston Pl., 1 story, basmnt. to 2 story, 110x125 ft., rein.-con., steel warehouse, $80,000.

★**Wash., Tacoma**—ZINC PLANT—American Smelting & Refining Co., E. A. White, mgr., Ruston, zinc plant. $2,000,000. P. E. Richardson, Garfield, Utah, engr.

Wis., Sheboygan — BOTTLING HOUSE — Kingsbury Breweries, 1012 New York Ave., plans completed by Satre & Senescall, 161 Michigan Ave., 1 and 2 story, 55x145 ft., steel, brick bottling house. Legal obstacles to be overcome.

Ont., Toronto — PRINTING PLANT — Arthurs Jones Ltd., 545 Adelaide St. W., plans by W. A. Armstrong, 19 Melinda St., 4 story, basmnt., 90x100 ft. steel frame printing plant on Adelaide St. W., $100,000.

READY FOR BIDS

N. Y., New York—FREIGHT HANDLING STATIONS—Vanneck Realty Corp., 17 E. 42 St., Zone 17, plans completed by C. S. Ward, 431 W. 14 St., Zone 14. 1 story freight handling stations at 404 E. 31 St., $40,000; at 436 E. 31 St., $35,000; at 425 E. 30 St., $35,000.

CONTRACTS AWARDED

Md., Baltimore—WAREHOUSE—Maryland Glass Corp., 2147 Wicomico St., 2 story brick warehouse, to Cummins Constr. Corp., 803 Cathedral St. Est. $50,000.

UNCLASSIFIED

PROPOSED WORK

Ala., Birmingham—BROADCASTING STATION—Birmingham News Co. (WSGN), Dixie Carlton Hotel, FM broadcasting station, 309 N. 23 St. Over $25,000.

Ala., Birmingham—BROADCASTING STATION—Voice of Birmingham (WAPI), 2021 First Ave., FM broadcasting station. Over $25,000.

Ala., Mobile—BROADCASTING STATION—Pape Broadcasting Co. (WALA), 104 St. Joseph St., FM broadcasting station. Over $25,000.

Calif., Hollywood—BROADCASTING STATION—Warner Bros. Broadcasting Co. (KFWB), 5833 Fernwood Ave., Los Angeles, FM broadcasting station. Over $25,000.

Calif., Long Beach — BROADCASTING STATION—Consolidated Broadcasting Corp., Ltd. (KGER), 435 Pine Ave., FM broadcasting station. Over $25,000.

★**Calif., San Francisco**—PLAYGROUND, etc.—Bd. Educ., E. E. Niccola, deputy supt., City Hall, 6 year program, 2nd year, playground for Commodore Stockton School, $182,500; 3rd year, athletic field for Abraham Lincoln High School, $172,500; 4th year, playground at Grant School, $102,500; 5th year, athletic field at George Washington High School, $94,000; 6th year, ground development at San Francisco College, $290,000, playground expans., $250,000.

Conn., Hartford—BROADCASTING STATION—The Hartford Times, Inc. (WTHT), 983 Main St., FM broadcasting station. Over $25,000.

Conn., New London — BROADCASTING STATION—The Thames Broadcasting Corp. (WNLC), 231 State St., FM broadcasting station. Over $25,000.

Fla., Miami—BROADCASTING STATION—Miami Broadcasting Co. (WQAM), 227 N.E. First Ave., FM broadcasting station. Over $25,000.

Fla., Tampa—BROADCASTING STATION—Tampa Times Co. (WDAE), Tampa Terrace Hotel, FM broadcasting station. Over $25,000.

★**Illinois**—AIRPORT—Madison Co., c/o Bd. Supervs., Court House, Edwardsville, and Madison—St. Clair Counties Com. for Aviation Planning c/o F. Parks, vice-pres., Parks Air College, Parks Airport, East St. Louis. Class 4 airport, incl. three 5,200 ft. runways designed to be extended to 15,000 ft., if necessary, lighting, drainage and water facilities, hangars, shops, administration bldg., etc., in area east of Horseshoe Lake, Madison Co. $2,150,000.

Yoloy Pipe

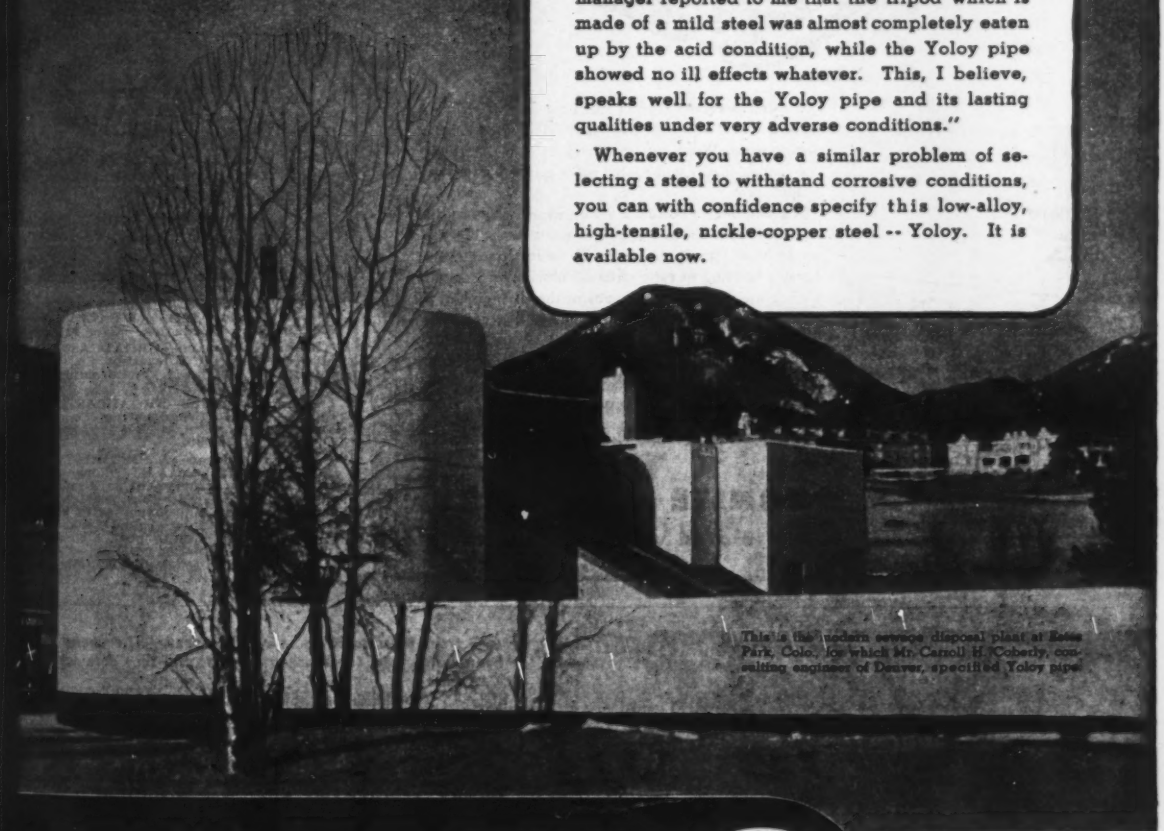
RESISTS CORROSION

WHEN the Estes Park, Colorado, sewage disposal plant was built, Yoloy pipe was installed to carry the sludge gas from the digestor. Yoloy was selected for this application because of its proven ability to resist corrosion--and it has lived up to its reputation.

Recently it became necessary to make a repair due to a mechanical break in one of the fittings, and the interior of the sludge digestor could conveniently be inspected. The engineer in charge of the project makes this report:

"The Yoloy pipe was supported on a tripod resting on the bottom of the digestor. The city manager reported to me that the tripod which is made of a mild steel was almost completely eaten up by the acid condition, while the Yoloy pipe showed no ill effects whatever. This, I believe, speaks well for the Yoloy pipe and its lasting qualities under very adverse conditions."

Whenever you have a similar problem of selecting a steel to withstand corrosive conditions, you can with confidence specify this low-alloy, high-tensile, nickle-copper steel -- Yoloy. It is available now.



This is the modern sewage disposal plant at Estes Park, Colo., for which Mr. Carroll H. Cobeth, consulting engineer of Denver, specified Yoloy pipe.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

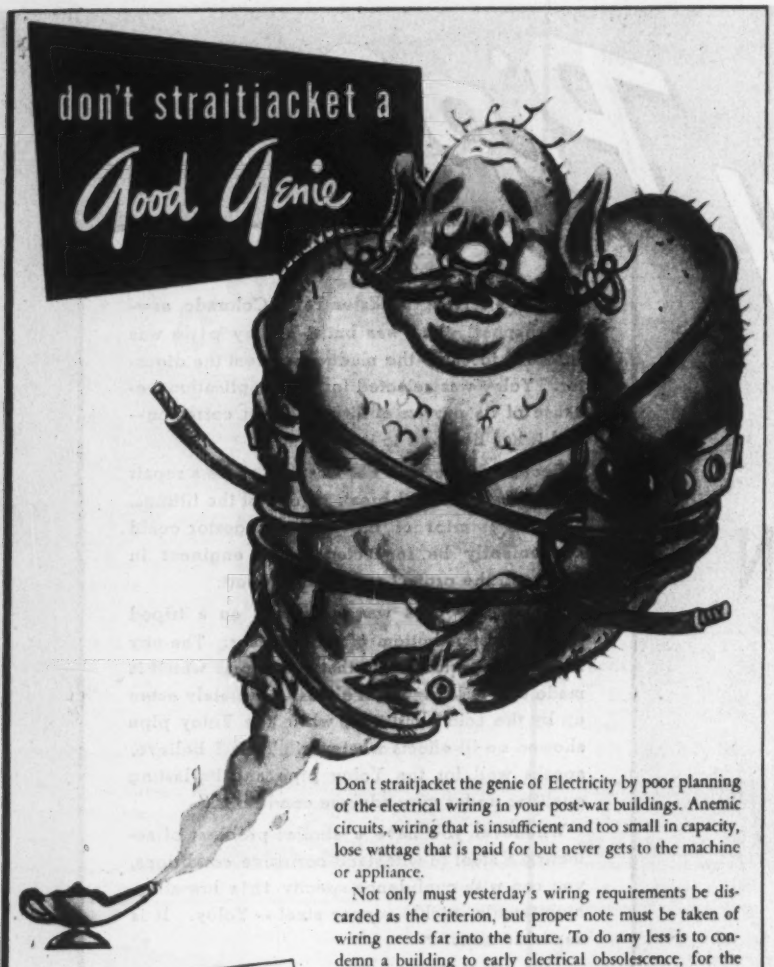
YOUNGSTOWN, OHIO

Manufacturers of

CARBON . ALLOY AND YOLOY STEELS

YOLOY STEEL — YOUNGSTOWN

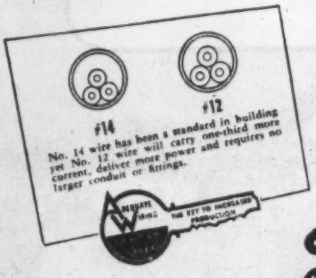
Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Coke Tin Plate - Electrolytic Tin Plate - Rods - Wire - Nails - Tie Plates and Spikes.



Don't straitjacket the genie of Electricity by poor planning of the electrical wiring in your post-war buildings. Anemic circuits, wiring that is insufficient and too small in capacity, lose wattage that is paid for but never gets to the machine or appliance.

Not only must yesterday's wiring requirements be discarded as the criterion, but proper note must be taken of wiring needs far into the future. To do any less is to condemn a building to early electrical obsolescence, for the greater use of electrical equipment that is promised us will be seriously hampered in buildings that are inadequately wired.

Adequate, proper wiring is a *must*, if tomorrow's buildings are to make full use of cheap, plentiful, labor saving electricity. The Okonite Company, Passaic, New Jersey.


#14
#12
No. 14 wire has been a standard in building yet No. 12 wire will carry one-third more current, deliver more power and requires no larger conduit or fittings.

OKONITE and HAZARD
Insulated wires and cables

3831

POSTWAR PROJECTS (Cont'd.)

Ill., Alton and Woodriver—AIRPORT—Madison Co., c/o County Bd. Supervs., Edwardsville and Madison—St. Clair Counties Com. for Aviation Planning, c/o F. Parks, vice-pres., Parks Air College, Parks Airport, East St. Louis, Class 2 airport, with 2,500 ft. and 3,500 ft. runways, water and drainage facilities, lighting, administration bldg., etc. $400,000.

★**Ill., Belleville**—St. Clair Co., c/o County Bd. Supervs., Belleville, and Madison-St. Clair Counties Com. for Aviation Planning, c/o F. Parks, vice-pres., Parks Air College, Parks Airport, East St. Louis, Class 2 airport with 2,500 ft. and 3,500 ft. runways, water and drainage facilities, lighting, hangars, administration bldg., etc., about 3 mi. north of here. $400,000-$500,000.

Ill., Bloomington—BROADCASTING STATION—Radio Station WJBC, Bloomington, FM broadcasting station. Over $25,000.

Ill., Chicago—BROADCASTING STATION—Agricultural Broadcasting Co. (WLS), 1230 W. Washington Blvd., FM broadcasting station. Over $25,000.

Ill., Decatur—PARK BLDG.—Decatur Park Dist., Decatur Club Bldg., park equip. maintenance bldg. for Nelson Park. $30,000.

★**Ill., Edwardsville**—AIRPORT—Madison Co., c/o County Bd. Supervs., Edwardsville and Madison—St. Clair Counties Com. for Aviation Planning, c/o F. Parks, vice-pres., Parks Air College, Parks Airport, East St. Louis, Class 2 airport with 2,500 ft. and 3,500 ft. runways, water and drainage facilities, lighting, hangars, administration bldg., etc. south of here. $400,000-$500,000.

Ind., Muncie—BROADCASTING STATION—D. A. Burton (WLBC), Radio Center, Muncie, FM broadcasting station. Over $25,000.

Ind., Terre Haute—BROADCASTING STATION—Banks of the Wabash, Inc. (WBOW), 302 S. 6 St., FM broadcasting station. Over $25,000.

Ia., Davenport—BROADCASTING STATION—Tri City Broadcasting Co. (WOC), 1002 Brady St., FM broadcasting station. Over $25,000.

Ky., Louisville—RADIO STATION—Northside Broadcasting Corp., (WGRC), Kentucky Home Life Bldg., FM radio station. Over $25,000.

Ky., Owensboro—BROADCASTING STATION—Owensboro Broadcasting Co., Inc. (WOMI), Byars Ave., and Livermore Rd., FM broadcasting station. Over $25,000.

La., New Orleans—AIR TERMINAL—Delta Air Corp., Hibernia Bldg., expanding air terminal. Over $150,000.

Me., Rumford Falls—AIRPORT—Municipality, J. Merton Wyman, town mgr., airport. $100,000.

Me., Rumford Falls—PARK—Municipality, J. Merton Wyman, town mgr., addnl. athletic park imprvs. $30,000.

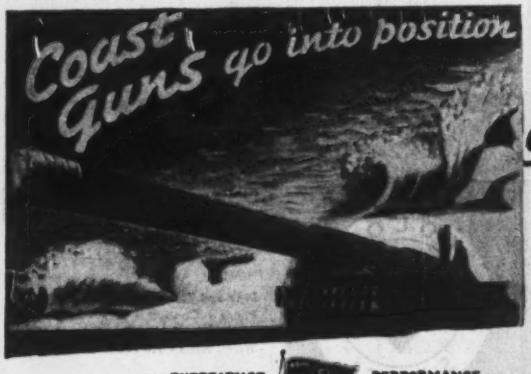
Md., Baltimore — RADIO STATION—Hearst Radio, Inc., (WBAL), Lexington Bldg., FM radio station. Over $25,000.

Mich., Kalamazoo—BROADCASTING STATION—Fetzer Broadcasting Co., (WKZO), Burdick Hotel, FM broadcasting station. Over $25,000.

Minn., St. Paul—BROADCASTING STATION—WMIN Broadcasting Co., 1237 St. Anthony Ave., Zone 4, FM broadcasting station. Over $25,000.

N. Y., Celoron—AMUSEMENT PARK—Celoron Realty Co., H. Illions, pres. and mgr., Celoron, amusement park imprvs., midway fronts, new roller coaster, concrete swimming pool, summer theatre bldg., erection 7 ft. wire fence around park, chlorinating sys. for swimming pool, etc., $50,000.

O., Columbus — STADIUM — Bd. Educ., stadium at Linden-McKinley High School, $30,000. Raising funds.



EXPERIENCE builds 'em PERFORMANCE sells 'em

SAFE from Invasion is no idle boast today. The enemy has been driven from the Alaskan outposts and they dare not attack us here!

ROGERS TRAILERS have played a big part in fortifying our coastlines and they are fighting with our men overseas!

on ROGERS TRAILERS

The ROGERS TRAILERS which will be available to industry when present war contracts are completed, will be even better-engineered and more efficient than the thousands which have been operated so successfully for many years.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

Making strong the things that make America strong

iving a Truck the "Guts" for the Ruts . . .
aking an Air Tool Move "in the Groove"

RIME MOVER rushing supplies to the t . . . lurching over war-torn terrain victory the reward of arrival on or defeat the penalty of a breakdown needs bolts and nuts that hang on for life.

n air tool, too, needs bolts and nuts resist vibration . . . but the require- ts of a fast-moving assembly line in ir tool manufacturers' plant also call asteners that mate easily, tighten up kly, keep production rolling full d ahead.

hether your chief requirement in bolts and nuts is strength to resist stress, vibration and shock; or wrenching speed that satisfies the time-clocking scrutiny of a cost accountant . . . you can do better fastening with RB&W EMPIRE products.

The 99-year history of RB&W is a succession of new process developments for improving bolts and nuts . . . from the world's first automatic cold header . . . to modern metal-working techniques for incorporating greater accuracy and strength and improved appearance.

Further developments now planned will strengthen the conviction of RB&W users that RB&W fasteners belong in their farm implements, automobiles, railroads, aircraft, power and transmission equipment, construction projects or general industrial products in which assembly speed and strength are so essential.

RB&W

Russell, Burdsall & Ward Bolt and Nut Company. *Factories at:* Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. *Sales offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle.

SPECIFY

HAYS

STOPS and FITTINGS
FROM SERVICE LINES THROUGHOUT COMPLETED BUILDING

Where your reconversion program calls for alterations, additions, or new building requiring stops and fittings for water, gas, oil, steam, air, or coolant liquids—specify Hays.

Seventy-five years' experience in engineering research, together with a unified system of manufacturing control removes all doubt as to the quality of Hays products.

Our complete line of stops and fittings cover every type of application. Send us your specific requirements. Complete information will be sent promptly, without obligation.

BE SURE TO REPLACE WITH ANOTHER HAYS STOP

HAYS

FOR LIQUIDS, STEAM AND GASES
PIPING PRODUCTS
HAYS MANUFACTURING CO., ERIE, PA.

ERIE BUCKETS

• Erie builds all types of buckets in various capacities and weights to meet the job and operating conditions. Choose the correct bucket for the job and you get maximum speed and output. Write for broadside on the complete Erie line of buckets.

THE COMPLETE LINE

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

POSTWAR PROJECTS (Cont'd.)

Okla., Lawton—PARK IMPROVEMEN —City, E. Glenn, mayor, park imprvs., $2 000.

R. I., Bristol—ATHLETIC FIELD, et City, H. F. Hill, chn. Post War Co Guiteras Memorial Athletic Field, field ho stands, flood lights. $30,000.

R. I., Bristol—SWIMMING POOL—Tw H. Hill, chn. Post War Com., Bristol, mu cipal swimming pool, may also develop to beach, $25,000.

Tex., Dallas — AIRPORT BLDG. — Da Aviation School & Air College, Marsh Fl Midway Church Rd., airport bldg. O $40,000.

Tex., San Antonio—HANGARS—Te Southern Air Lines, F. E. Pummill, Majestic Bldg., 20 permanent type hang over $300,000.

Tex., Weslaco—AIRPORT—Town, R. Christensen, chr., airport comm., airp $100,000.

Tex., Yorktown—AIRPORT—City, muni pal airport incl. runways, hangar, fuel sys., shop, etc., $80,000. CD 8/9—ENR 8/ under Unclassified.

Wash., Bremerton—TRAFFIC CONTR SYSTEM, etc.—City, E. J. McCall, ci City Hall, plans city-wide traffic control s $50,000; wharf and waterfront impr $25,000.

Wash., Vancouver—PORT TERMINAL Port of Vancouver, City Hall, reconstructi Terminal 7, foot of Columbia St., increas ship berth space, addn. trackage. Terminal below r. r. bridge. $400,000. Bond elect Nov. 7.

★**Wis., Milwaukee**—RADIO BROADCAS TING STATION—Hearst Radio, Inc., Milwaukee Sentinel, 123 W. Michigan Zone 3, WISN radio broadcasting stati $1,000,000.

Alta., Magrath—AIRPORT—Municipal airport. $100,000.

Alta., Medicine Hat—AIRPORT—Muni pality, H. Lang, mayor, airport. $150,000.

Alta., Olds—AIRPORT—Municipality, A. Dunkley, mayor, airport. $150,000.

B. C., Victoria—AIRPORT—Municipal airport at present Gordon Head milita camp site. $150,000.

★**B. C., New Westminster**—WHARVES City, City Hall, exten. wharves on wat front from 8 St. to Pattullo bridge 100 into river. $1,000,000.

★**Ont., Hamilton**—ARENA—City, memor sports arena. $1,000,000.

PLANS UNDER WAY

Ill., Decatur—STREET LIGHTING, etc. City, City Hall, lighting Water St. fr Wabash to Division St., $22,137; Monroe from Main to Division Sts., $38,567; Eldora St. from Water to Jasper Sts., $66,765; M St., from Wood St. south to city limi $28,175; Eldorado St. from Main St. to Fa view Ave., $35,875; Wood St. from Waba to 22 Sts, $48,687; principal Mercantile Di $49,712; generating station installati $123,000. Warren & Van Praag, Standa Office Bldg., consult. engrs.

Ill., Decatur—GREENHOUSE — Decat Park Dist., Decatur Club Bldg., plans i completed greenhouse in Fairview Pa $25,000; plans 75% completed drainag grading, and relaying water lines, nec sary to rebuilding Scoville Golf Cour $95,000.

Ill., Pinckneyville—SWIMMING POOL —Pinckneyville City Park, City Hall, pl completed 40x60 ft. swimming pool, $25, 1 mi. bituminous road, 4 new tennis cou $10,000. Financing not yet provided Decatur Engineering Service Co., Decat Club Bldg., consult. engrs.

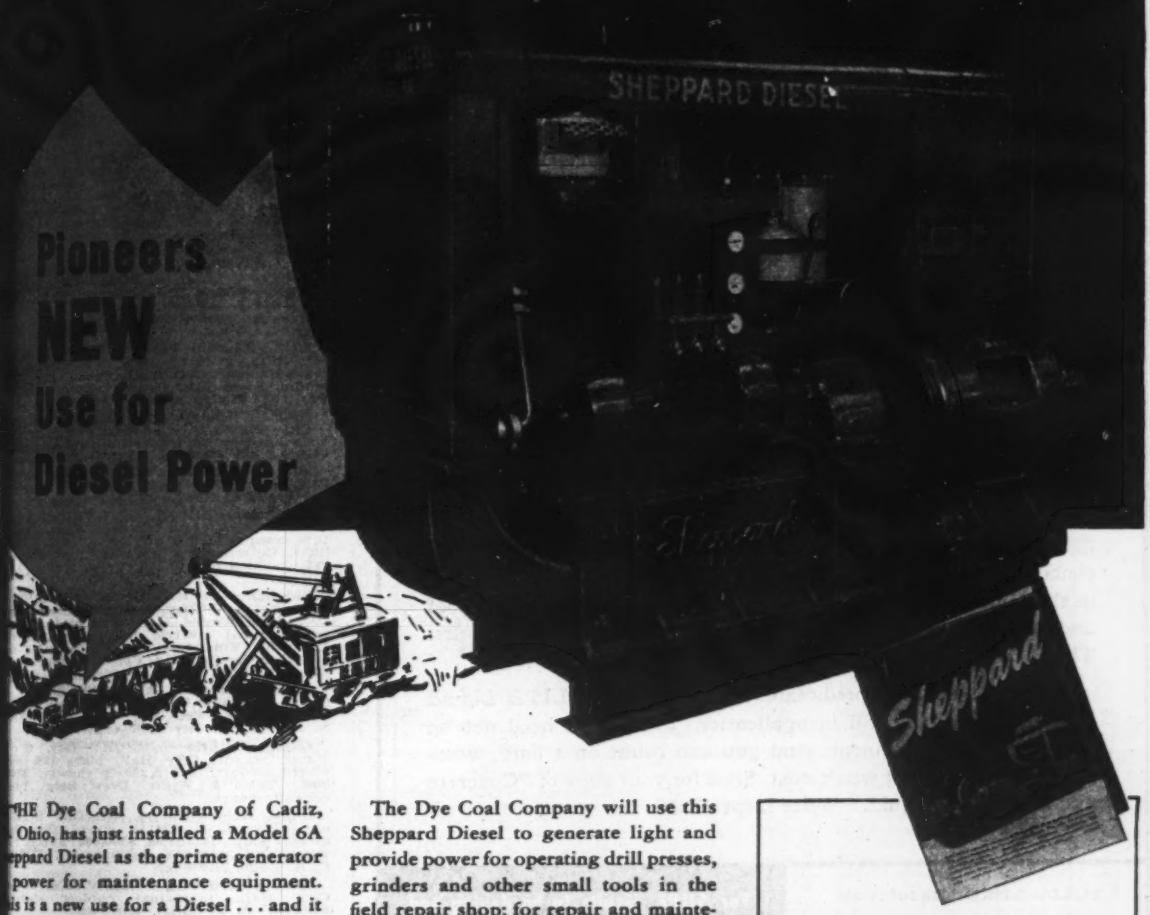
Ia., Boone—AIRPORT—City, F.W. Gan mayor, City Hall, municipal airport. $60, Stanley Eng. Co., Muscatine, consult. e

Ia., Des Moines—AIRPORT BLDG.— MacVicar, mayor, City Hall, administrati bldg., at airport. $350,000. Wm. N. N son, Hubbell Bldg., archt. CD 1/25—E 2/10.

Ia., Waterloo—SWIMMING POOL—C R. B. Shipley, mayor, swimming po $40,000. E. E. Schenk, Waterloo cons engr.

★**Michigan** — PARKS — State Conserva Dpt., P. J. Hoffmaster, dir., Lan plans completed imprv. Port Huron P $500,000; Bay City Park $638,500; Alg Park $655,000; Muskegon Park $47 Baraga Park $24,000; Boomer No. 2 P $28,000; Boomer No. 3 Park $12,000; Bri Park $51,000; Burt Lake Park $75 Dodge No. 4 Park $40,000; Dodge No. 5 P $7,000; Dodge No. 8 Park $15,000; P Tawas Park $15,000; Fort Wilkins P $82,000; Gobegic Lake Park $28,000; Gr Haven Park $35,000; Harrisville P $23,000; W. J. Hayes Park $115,000; Hi Lake Park $51,000; Hoeft Park $36,000; land Park $100,000; Sleeper State P $50,000; Indian Lake Park $36,000; In lochen Park $297,000; Island Lake P $119,000; Ludington Park $100,000; Mac Park $70,500; Mitchell Park $60,000; Mo Park $25,500; Orchard Beach Park $75, Otsego Lake Park $20,000; Palm Book P $86,500; Silver Lake Park $35,000;

NEW *Sheppard* Installation in Strip Mine



Pioneers NEW Use for Diesel Power

THE Dye Coal Company of Cadiz, Ohio, has just installed a Model 6A Sheppard Diesel as the prime generator power for maintenance equipment. This is a new use for a Diesel . . . and it points the way to improved operation and substantial power economies in similar installations.

The Sheppard Diesel used by the Dye Coal Company is a Model 6A direct-connected . . . by means of a double engagement flexible coupling . . . to an 18.7 KVA—AC 120/240 volt, 1200 R.P.M. generator. This unit is mounted on a steel beam base and is equipped with an automatic starting control.

The Dye Coal Company will use this Sheppard Diesel to generate light and provide power for operating drill presses, grinders and other small tools in the field repair shop; for repair and maintenance of power shovels, bulldozers, trucks and other equipment for stripping operations. On priority, Sheppard Diesels are available NOW to essential industries. Sheppard Diesels for post-war use in all industries may be "reserved" through the Sheppard Post-Priority Plan. Before buying any Diesel or a substitute power source, check on the availability of Sheppards.

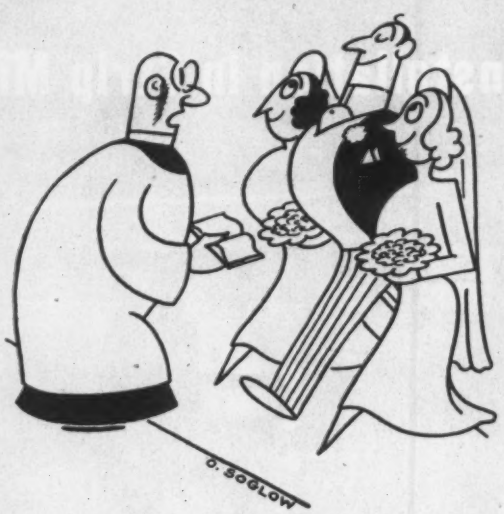
Free Bulletin—JUST PUBLISHED—Shows Sheppard Pump Applications

Sheppard Diesels are standard equipment on the pumps of many nationally known manufacturers. Sheppard also supplies complete pump units. Learn how Sheppard performance is cutting pumping costs . . . increasing pump output . . . in diversified industries. Write today for free Sheppard pump bulletin . . . just published.

R. H. SHEPPARD COMPANY, HANOVER, PA.

Sheppard

ALL AMERICAN DIESELS



WHEN YOU HAVE TO BE

SURE OF RESULTS

. . . You must use methods and material you can trust! You have a concrete floor. It is dusting. You have a heavy production schedule in the building which cannot be interrupted. You must dustproof and harden floors for heavy duty. You have to be SURE of results. That's the time to specify LAPIDOLITH Liquid.

You'll get definite, predictable results. LAPIDOLITH Liquid requires no special skill in application. Production need not be stopped during treatment. And you can count on a hard, wear-resisting surface that won't dust. Send for your copy of "Concrete and Lapidolith Liquid." Write Dept. R-18.

BUILDING PRODUCTS DIVISION

L. SONNEBORN SONS, Inc.

88 LEXINGTON AVENUE
NEW YORK 16, N. Y.

For SURE results in hardening and dustproofing concrete floors count on

SONNEBORN'S LAPIDOLITH LIQUID

MacArthur

34 YEARS INSTALLING PILES OF EVERY TYPE

CAST-IN-PLACE CONCRETE COMPOSITE
STEEL SECTIONAL PIPE TIMBER

SOIL AND ROCK EXPLORATION

MacARTHUR CONCRETE PILE CORPORATION
18 EAST 48th STREET. NEW YORK 17, N. Y.
BOSTON • CINCINNATI • NEW ORLEANS

POSTWAR PROJECTS (Cont'd.)

Park $45,000; Traverse City Park $10,000; Wells Park $28,000; Wilderness Park $264,500; Wilson Park $24,500; Youngs Park $31,000; Grayling Winter Sports $80,000; Waterloo Park $161,000; Yankee Springs Park $133,000; park access highways $500,00, developing 10 picnic areas $310,000; bathing and beach development $410,000; tent and trailer accommodations $330,000; parkways and parking areas $250,000, grading and filling $200,000, all foregoing in southeastern Michigan; improv. Porcupine Mountain Park, incl. hy. from Silver City to Black River $1,500,000 drives $500,000; winter sport grounds development $100,000; foot trails $35,000, tent and trailer grounds $30,000, tourist lodgings $70,000, all foregoing in Silver City-Porcupine Mountain area; development Sterling State Park, incl. beach and waterfront development, in Monroe $2,016,000; tourist camps, housing, drives, recreational facilities, new park at Tahquamenon Falls $1,283,000; beach and waterfront development, 2 bath houses, cafeteria, concession bldgs., Warren Dunes Park $1,745,000. Plans to be submitted to State Planning Comn. and to Legislature for financing.

Mich., Ferndale—PARK IMPROVEMENT—City, preliminary plans underway improve park. $60,000. J. F. Gibbs, Ferndale, city mgr.

Mich., Grosse Pointe Park—PARK—Village, 15113 Jefferson Ave., Zone 39, plans underway park. $75,000. E. B. Lane, village mgr.

Mich., Lincoln Park—SWIMMING POOL etc.—City, P. Wks. Dpt., 1612 Howard St., plans underway, swimming pool, bath house, stadium and field house. $239,000. E. R. Pate, 532 Michigan Blvd., Detroit, city engr.

Mich., Wyandotte—SWIMMING POOL, etc.—City, 75x150 ft., rein.-con. swimming pool with bath house, water purifier, etc. $250,000. F. W. Liddle, City Hall, city engr.

Miss., Hattiesburg—SWIMMING POOL—City, swimming pool. $50,000. Financing not provided for. J. R. Estes, city engr.

Oklahoma—RURAL ELECTRIC LINES—Cotton Co. Electric Co-op., Walters, plans 10% completed 235 mi. addnl. rural electric lines, Cotton Co. $232,000. Financing not yet provided for. W. A. Potts, Walters, consult. engr.

Oklahoma—RURAL ELECTRIC LINES—East Central Oklahoma Electric Co-op. Asen, Okmulgee, plans 25% completed 150 mi. addnl. rural electric lnies, Okmulgee Co. $147,000. Financing not yet provided for. Midwest Engineering Co., McBirney Bldg., Tulsa, consult. engr.

Okla., Anadarko—AIRPORT—City, F. J. Callahan, mayor, City Hall, airport grounds and runway, $225,000; hangars, $100,000. N. M. Kunkel, City Hall, engr.

Okla., Guthrie—AIRPORT—City, O. E. Burst, mayor, City Hall, plans 10% completed airport, incl. 4,200 ft. runway. $240,000. Toler & Willis, Drew Bldg., Tulsa, consult. engrs.

Okla., Holdenville — AIRPORT BLDGS. etc.—City, J. E. Davis, mayor, City Hall, airport bldg., facilities, $200,000; airport runways and grounds development, $250,000. C. H. Edge, city engr.

Ore., Oregon City — ELEVATOR — City, City Hall, municipal outdoor elevator, $40,000. A. E. Miller, city engr.

★**Tex., Dallas**—AIRPORT—City, V. H. Smitham, mgr., plans 75% completed by H. Bartholomew & Associates, master planners, 317 N. 11 St., St. Louis, Mo., 3 runways, $1,080,000; bldgs., roads, lighting, etc. for Redbird Airport, $500,000. CD 5/26—ENR 6/15.

★**Tex., Dallas**—PARKS, etc.—City, plans 50% completed addnl. parks, $500,000; Marsalis Park Zoo, $500,000. Bond election planned. Hare & Hare, Sophian Plaza, Kansas City, Mo., archts.

★**Tex., Fort Worth**—AIR TERMINAL—City, S. H. Bothwell, mgr., designing parallel runway type air terminal, 2 and small fields, four 6,000x150 ft. and four 7,500x150 ft. runways, administration bldg., 6 hangars, 1 firehouse. $6,919,880. C. W. Thelin, Fort Worth, city designing engr. CD 2/10—ENR 2/24

Tex., Harlingen—STADIUM—City, plans 40% completed 2 story, rein.-con. stadium in Fairpark. $80,000. A. Tamm, 107 S. 1 St., engr. CD 8/31—ENR 9/21.

Que., Mansonville—RURAL ELECTRIFICATION SCHEME—Municipality of Potton, c/o R. F. Cowan, secy., Masonville, rural electrification scheme. $100,000. Quebec H-E Com., Quebec City, engr.

READY FOR BIDS

Ill., Decatur—PARK NURSERY, etc.—Decatur Park Dist., Decatur Club Bldg., plans completed park nursery in Fairview Park, $10,000; sidewalks in Lincoln Park, $3,000; park storm sewer in Nelson Park, $8,000. L. Chandler, supt., Decatur Park Dist., engr.

★**Mich., Romulus**—AIRPORT—Bd. Com. Wayne Co., 3800 Barlum Bldg., Detroit, plans completed enlarging Wayne County Airport, incl. grading, drainage, runways, parking strips, $1,000,000. L. C. Smith, 3800 Barlum Tower, Detroit, co. engr.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ELSIE EAVES, Manager — *SCOTT McLEOD, Statistics* — *J. A. MAHONEY, Reports*

(Daily service also available—Write for details)

WATER SUPPLY

PROPOSED WORK

Ind., Kingman—Town Bd., E. Alward, ..., making plans WW sys. $25,000. Macy-..der Engrg. Co., Bellefontaine, O., consult. engr.

Ind., Troy—Town, WW sys., 1 m.g. reser-... with number of deep wells. $50,000 or ... M. L. Burden, Tell City, engr. CD ...—ENR 9/24.

Ind., Vredersburg—Town Bd., M. Boatman, ..., City Hall, imprv., exten. WW sys. ...,000. Macy-Snider Engrg. Co., Bellefon-..., O., consult. engr.

Kan., Kansas City—Bd. P. Utilities, ... J. D. Donovan, mgr. Production and ..., making plans water purification ..., chemical house, settling basin, etc. ...,000. Burns & McDonnell, 107 W. Lin-...ed Blvd., Kansas City, Mo., engrs.

Pa., Lebanon—Dpt. Parks & Property, ... City Hall, making plans, water reservoir ... pipeline, incl. low earth dam, approx. ... mi. 30 in. pipe. $500,000. Gannett, Flem-..., Corddry & Carpenter, Inc., 606 N. ... Harrisburg, engrs.

Tex., Houston—City, 1 story, brick steel, ...crete pump. station. $50,000. G. Fugate, ... engr.

†Utah, Helper—City, 2 m.g. reservoir, ...ah 43-147-N. $52,000. FWA.

Que., St. Ambroise—Municipality, A. E. ...ulin, secy., WW sys. extens. $35,000.

†Alaska, Fairbanks—City, City Hall, ... wells, pumps, water treatment plant, ...ating plant, water supply and distr. lines, ...wage pump. facilities. $1,754,084. FWA. ...ack & Veatch, 4706 Bway., Kansas City, ..., engrs. CD 10/14—ENR 10/12.

BIDS ASKED

Bids Asked October 24

Ia., Spirit Lake—Bd. Supervs. Dickinson ..., furnishing, installing 1,400 lin. ft. 6 in. ...iron watermain, installing 13,895 lin. ft. ... to 30-in. tile in Drainage Dist. 30. R. A. ...rman, Spirit Lake, co. engr.

Bids Asked October 26

Wis., Marinette—City, reconstructing water ...mp. sta., booster pump. sta., transmis-...n line and elevated tank. $50,000. Plans ...posit $10. Foth, Boyd & Porath, Colum-... Bldg., Green Bay, engrs. CD 9/20—...R 9/21.

Bids Asked October 27

S. C., Charlotte—City, R. W. Flack, mgr., ...y Hall, 2 raw water pump. units and 1 ... type stop-check valve for Catawba ...er pump. station. J. N. Pease & Co., ..., Johnston Bldg., engr. CD 9/27—ENR ...1.

Bids Asked October 31

Tex., Colorado City—J. A. Sadler, mayor, ...y Hall, water storage reservoir, appur-...ances. $200,000. Plans deposit $25. ...ese & Nichols, Capps Bldg., Fort Worth, ...rs. CD 9/28—ENR 10/5.

Wis., Lake (P. O. Milwaukee)—Town of ...ke Water Utility, 4001 S. 6 St., drill ... Plans deposit $5. Mead, Ward & ..., 550 State St., Madison, Zone 3, consult. ...rs. CD 8/1—ENR 8/3.

Bids Asked November 1

Tex., Fort Worth—S. H. Bothwell, city ..., City Hall, Contr. 3, removing pump. ... from Holly Pump. Plant, Tex. 41-641. ...A. Plans deposit $10. Freese & Nichols, ... Capps Bldg., engrs. CD 10/2—ENR ...

Bids Asked After November 15

Md., Baltimore—Water Dpt., Municipal ...Bldg., approx. 26,000 ft. rein.-con. lined ...er tunnel, connecting Lake Ashburton ... Montebello filtration plant. $2,235,000.

Bids Asked

B. C., New Westminster—Municipality, ...rmain extens., renewals. $70,000. A. ...ler, City Hall, Works supt. and engr.

LOW BIDDERS

Ind., Delphi—City Council, C. McCain, ...r, chn., City Hall, 1 story, brick, rein.-... pump. station addn. and underground ...rvoir, from Weikel Constr. Co., Inc., ... Fairfield Ave., Fort Wayne, $45,489. ...133,000. Henry B. Steeg & Associates, ...18 E. Market St., Indianapolis, consult. ... CD 8/2—ENR 8/10.

Ind., Millville—Dpt. P. Wks., City Hall, ..., general contract water purification ... from Interboro Co., 109 E. 29 St., ... York, N. Y., $106,211. CD 10/3.

Ind., Coatesville—City, Oct. 9, water sup-...Birch Run, incl. brick or concrete man-...repaving where necessary, bituminous ...macadam concrete surfacing on dam, ...Costone Bros., Verona, N. J., $124,879.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Latin America
Sewers, Waste Disposal	Public Buildings
Bridges	Commercial Buildings
Streets & Roads	Industrial Buildings
Earthwork, Waterways	Unclassified

Stages Reported

PROPOSED: (except Streets & Roads);
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Tex., Houston—City, M. H. Westerman, secy., City Hall, Oct. 4, furnishing gate valves for S.W. pump station and well field, from Ludlow Valve Co., 2615 Fannin St., $35,768. CD 9/26.

Tex., Houston—City, c/o M. H. Westerman, secy., City Hall, Oct. 11, 36 in. c.i. transmission main in Kirby Dr. and South Blvd., from R. P. Farnsworth & Co., Bankers Mortgage Bldg., $104,854. CD 10/5.

CONTRACTS AWARDED

†Fla., Key West—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., water treatment plant for water supply, NOY 9336, to Gabel Constr. Co., 101 W. Pine St., Orlando, $180,000. CD 4/19.

O., Cleveland—City, F. Foy, purch. agt., City Hall, furnishing, installing pumps at Division Fairmount and Kirtland Station, to Dravo Corp., 4810 Prospect Ave., $153,195. CD 9/21—ENR 9/28.

†Tex., Weslaco—Town, WW imprvs., Item 1, Tex. 41-688-N, to Dayton-Dowd Co., M & M Bldg., Houston, $17,249. FWA. CD 10/10—ENR 10/12, under LB.

Alta., Grande Prairie—Dpt. Transport, Ottawa, Ont., installing waterworks and sewerage sys. at airport, to R. B. McLeod & Co., Ltd., Saskatoon, Sask., about $76,000.

Ont., Ottawa—W. E. MacDonald, engr., c/o City and Chairman Bd. Control, City Hall, water purification plant addn. Lemieux Island, to Ross-Meagher, Ltd., 9 Echo Dr., Ottawa, $32,989. Bids 10/3. CD 9/19—ENR 9/21.

Que., Ste. Therese—G. E. Filiatrault, town secy., WW exten., to Lucien Massicotte, 504 Notre Dame St., Cap de la Madeleine, $47,800. Bids 9/18. CD 9/7—ENR 9/14.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Conn., Stratford—Chance Vought Div. United Aircraft Corp., 550 Main St., preparing plans brick, concrete incinerator plant, etc. Albert Kahn Associated Architects and Engineers, Inc., 345 New Center Bldg., Detroit, Mich., engrs.

★**†Ill., Granite City**—City, E. B. Grantham, mayor, approx. 17,500 ft. 18- to 84-in. relief sewers, manholes, inlets, appurtenances, etc., sewage pump. sta. with pump. equip., etc., Ill. 11-302N. $581,925. FWA. Sheppard, Morgan & Schwab, Alton, engrs. CD 9/13—ENR 9/21.

Ill., Nameoki—Village, F. P. Schuman, atty., sanitary sewers. $100,000. Will apply for FWA. gr. Sheppard, Morgan & Schwab, Alton, engrs.

Wis., Wauwatosa—Bd. P. Wks., rejected bids Sept. 25, sanitary sewer in W. Meinecke Ave. M. F. Linnan, city engr. CD 10/4—ENR 10/22.

BIDS ASKED

Bids Asked October 23

N. J., Glen Rock—Borough, Municipal Bldg., sewage pump. sta., appurtenances, northerly side of Harristown Rd. and easterly side of Diamond Brook. F. Evans, 1 Birchwood Rd., engr.

N. Y., Stapleton (sta. Staten Island)—Commissioner Marine & Aviation, Pier A, foot of Battery Pl., North River, New York, Zone 4, repairing wood-stave sewer exten. inshore from inshore end of Pier 14, at foot of Canal St., Contr. 2417, Boro of Richmond. Plans deposit $1.

Bids Asked October 25

†Va., Hilton Village (br. Newport News)—At office J. C. Morris, dir. P. Wks., Hilton Village, addnl. sewerage facilities, incl. 3,944 ft. 8 in. c.i. force main, 16,000 ft. 8 in. and 10 in. sewer lines, 6,880 ft. 6 in. house connections, constructing sewage pump sta. on site near intersection of Roanoke Ave. and 38 St., in vicinity of Copeland Park and Newsome Park, for Warwick Co., Va. 44-398. $417,000. FWA. Plans deposit $25. Massey & Johnson, Farr Bldg., Fairfax, consult. engrs. CD 10/13.

†Me., Presque Isle—U. S. Eng., 31 St. James Ave., Boston, Mass. (selected list bidders), brick, concrete incinerator, No. 19-023-45-Neg-44. $30,000.

LOW BIDDERS

Calif., Los Angeles—Bd. Supervs., Los Angeles Co., Hall of Records, Oct. 10, 10,410 lin. ft. 6 and 8 in. vitr. clay sanitary sewer in Exeter and other streets, C.I. 1094, from G. Miller, 2147 W. Silver Lake Dr., $32,931. Est. $33,650. CD 9/9—ENR 9/21.

Calif., Sacramento—City, H. G. Denton, clk., City Hall, trunk line sewer in 18 and N. B Sts., from Fogelberg & Ritchie, 1432 Kearney St., El Cerrito, $84,610.

Ill., Springfield—City Comptroller, City Hall, Oct. 11, storm sewer for surface water in Outer Park Dr. from MacArthur Blvd. to First St., from Orfel Constr. Co., 5 Bway., Melrose Park, $33,363. Est. $49,000. CD 9/12—ENR 9/14.

Md., Towson—Comrs. Baltimore Co., Courthouse, Oct. 9, Contr. 89 S and W, sanitary sewers and water lines, from Gaines & Bautz, 212 Washington Ave., $352,450. G. D. Andrews, c/o owner, engr.

Tex., Houston—City, M. H. Westerman, secy., City Hall, Oct. 11, 60 in. sanitary sewer trunk line from Bway. at Park Terrace Blvd., to Winkler Dr. near Plum Creek, from Knutson Constr. Co., Commerce Bldg., $146,011. CD 10/5.

CONTRACTS AWARDED

Calif., Haywood—Oro Loma Sanitary Dist., 21845 Foothill Blvd., storm water trunk line outfall sewer facilities from Tract 651, Eden Twp. to creek crossing the Western Pacific Ry. right-of-way at places in particular location in Alameda Co., to Oakland Sewer Constr. Co., 9915 Walnut St., Oakland. Items 10 to 18, $27,249; Alt. A, $33,161; Alt. B, $21,141. C. Macabee, 156 University Ave., Palo Alta, dist. engr. CD 9/26—ENR 9/28.

Calif., San Pablo—San Pablo Sanitary Dist., F. Garfield, secy., Firehouse, San Pablo, sewer imprvs. in Assessment Dist. 18, El Sobrante, to Oakland Sewer Constr. Co., 9915 Walnut St., Oakland, $236,889. CD 10/2.

Pa., Manheim—Boro Manheim Auth., Borough Hall, sewage treatment plant, to R. R. Myers, Jr., Lewistown, $32,000. Bids 9/30, awarded 10/10. CD 9/22.

TEN THOUSAND POUNDS PRESSURE

at your fingertips!

FEATURES:

- Hardened Tool Steel or Bronze Plungers
- Bronze Pump Body
- Bronze Valves, Seats and Bonnets
- 26" Extension Lever
- Left-hand Pressure Connection
- Pressure Release Control Wheel
- Reservoir High Grade Cast-iron
- All Parts Readily Accessible

Single Plunger Pump on Medium Tank

Single Plunger Pump on Stand

Pump with Machine Steel Body, 30,000 lb capacity

Single Plunger Pump on Portable Truck

Double Plunger Pump on Large Tank

Watson-Stillman Hydraulic Hand Operated Pumps are self-contained units equipped with single or double plungers. These pumps are especially suitable for hydrostatic testing of pipe, valves, fittings, boilers and any equipment requiring an internal test. They are also used to operate hydraulic jacks, small machines and presses.

The single plunger type is available in pressure ranges from 1500 lbs. to 10,000 lbs. per sq. in., and can be mounted on three different capacity tanks, 180, 400 and 1500 cu. in. Can also be furnished mounted on stand and portable truck.

The double plunger type has a large and a small concentric plunger. The small plunger is directly connected to the hand lever and produces the high pressure. The large plunger can be locked to the small one by a simple turn of a clutch and produces four times the volume at one quarter of the pressure that the small plunger delivers.

The double plunger pumps are available in pressures ranging from 1500 lbs. to 10,000 lbs. per sq. in., and can be mounted on 400 cu. in. or 1500 cu. in. capacity tanks.

Special hand pumps with machine steel bodies can be furnished for pressures up to 30,000 lbs.

All pumps can be furnished with hydraulic gauges.

Complete details on all types are given in Bulletin 240-A. Distributor Products Division of The Watson-Stillman Co., Roselle, New Jersey.

Sold thru leading distributors

WATSON – STILLMAN

UNDERPINNING & FOUNDATION CO., INC.

ENGINEERS & CONTRACTORS

Hercules Piles — Caissons — Cofferdams
Arresting of Foundation Settlement
Shafts — Tunnels — Subways — Excavations
Bulkheads — Piers — Shipways — River Work
Engineering Construction of All Types

NO PROJECT TOO LARGE—NONE TOO SMALL

155 East 44th Street **New York 17, N. Y.**

SEWERS, WASTE DISPOSAL, Contracts Awarded (Cont'd.)

Pa., McKeesport—Comrs. Versailles Twp., F. A. Gerstner, secy., ... Congress ..., approx. 5,300 lin. ft. 8 and 10 in. sanitary sewer, manholes, Versailles Twp., to Cheatham Constr. Co., 48 Boundary St., Pittsburgh, \$32,798. Est. \$33,000. H. A. Shope, ... Amity St., Homestead, engr.

Tex., Dallas—City, monolithic storm sewers in Collett St., to E. ... Reeder Const. Co., 4013 Glendora St., \$34,046.

BRIDGES

PROPOSED WORK

†**Ore., Bend**—U. S. Forest Service, Dept. Interior, Post Office Bldg., Portland, bridge over Deschutes River at Pringle Falls.

Tex., Dallas—Dallas Co., c/o Comrs. Courthouse, Oak Cliff viaduct repairs. \$30,000. Cost to be borne by the State.

†**Tex., High Island**—U. S. Eng., 25 St. and Avenue F, Galveston, reconstructing 75 ft. sect. railway bridge, Mud Bayou crossing in Intracoastal Waterway. Over \$25,000.

Ont., Fort Erie—Town, W. C. Tait, clk., Fort Erie North, vehicular bridge connecting Central Ave. with New York Central tracks. \$200,000.

Ont., Owen Sound—City, W. G. Case, mayor, Miss G. Lediard, clk., bridge, ... About \$100,000.

BIDS ASKED

Bids Asked October 26

Virginia—Dpt. Hys., Richmond, receives structing bridge over James River, Howardsville, Route 602, Albemarle Co. Plans deposit \$2.

LOW BIDDERS

Mo., Kansas City—City, K. K. King, dir. P. Wks., City Hall, completing Mulberry St. viaduct approach to Intercity Viaduct, from L. V. Hites and Storms-Frew Constr. Co., City Bank Bldg., Kansas City, Mo., \$178,6... R. McKinley, City Hall, engr.

Pennsylvania—J. U. Shroyer, secy. Hys., Harrisburg, Oct. 10, 0.7 mi. concrete bridge superstructure and rein.-con. pavement, ... ft. wide, Carbon Co., from Pine Brook Iron Works, 105 Middle St., Scranton, \$31,... CD 9/26—ENR 9/28.

CONTRACTS AWARDED

N. J., Jersey City — Pennsylvania R. R., J. L. Gressitt, ch. engr., Broad St. Sta. Bldg., 1617 Pennsylvania Blvd., Phila. Pa., altering transfer bridge, involving new **piles, foundation** and extensive concrete work, to Allen Spooner & Son, Inc., Pier 11, North River, New York, N. Y., \$78,...

STREETS AND ROADS

BIDS ASKED

Bids Asked October 23

Pennsylvania—At office of J. U. Shroyer, secy. Dpt. Hys., Harrisburg, rein.-con. paving 7,099 ft. Route Legislative R-223, Sect. 3 and 4, Traffic R-403, City of Johnstown, West Taylor Twp., Cambria Co.; rein.-con. pavement on graded roadway 17,... Route Legislative R-140, Sect. I G, Traffic R-22, East Hanover Twp., Lebanon Co.

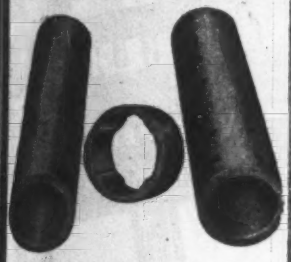
New Jersey—At office State Hy. Dpt., Miller, Jr., comr., Trenton, grading, ... penetration macadam on 4 in macadam surfacing 0.55 mi. access road to Lake Denmark, Denmark-Marcella Rd., Rockaway Twp., Morris Co. Plans deposit \$10.

Bids Asked October 26

Arkansas—J. H. Crain, chn. State Hy. Dpt., Little Rock, grading, bituminous on gravel surfacing 5.577 mi. Horseshoe Lake-Newhardt Rd., State Hy. 147, Crittenden Co., bituminous on gravel surfacing 5.116 mi. Bovine-East Road, Hy. 82, 5.116 mi., Ashley Co. W. W. Mitchell, state hy. engr.

BOSCO

Plain End Drain Pipe and Tru-Line Collars



Plain or perforated. Strength, absorption and acid solubility exceed specifications. Unexcelled for highway and airport drainage.

Also

ARMCRE FILTER BOTTOM BLOCKS

BOWERSTON SHALE COMPANY
BOWERSTON, OHIO

Drainage Material Specialists

"BERG"

CONCRETE SURFACER

MODEL R2-AS

A light weight, portable, electric motor driven Concrete Surfacer consisting of the Model R-2 Right Angle Head and Model AS Motor Unit.

Ideal for surfacing concrete construction and other applications.

Quickly converted into the Model R-2-AS Concrete Vibrator for internal vibration by substituting the Model V2 Vibrator Unit for the above Head.

THE CONCRETE SURFACING MACHINERY CO.

4467 SPRING GROVE AVENUE, CINCINNATI, 32, OHIO.

STREETS and ROADS Bids Asked (Cont'd.)

Bids Asked October 27

Minnesota—State Hy. Dpt. at District Maintenance Office, Morris, crushing, screening, loading and hauling about 27,300 cu. yd. gravel for traffic bound wearing course and for stockpiles for Maintenance Div., Morris, Stevens Co. **$35,000.**

Bids Asked October 30

Minnesota—State Hy. Dpt. at District Maintenance Office, Bemidji, crushing, screening, loading, hauling about 5,400 cu. yd. gravel and screening, loading and hauling about 13,335 cu. yd. gravel, for Maintenance Div., Bemidji, Beltrami Co.

Bids Asked November 1

California—State Div. Hys., Sacramento, grading, asphaltic concrete on crusher run paving and on existing pavement 0.7 mi. Hunters Point Blvd., Innes Ave. and Donahue St., San Francisco Co. G. T. McCoy, state hy. engr.

California—State Div. Hys., Sacramento, received no bids Oct. 13, grading, imported base material surfacing 0.9 mi. between 1.5 mi. east of Route 1 and Route 20, Humboldt Co.

†Missouri—U. S. Eng., 816 U. S. Courthouse & Customhouse, St. Louis, Zone 2, indefinitely postponed bids to have been opened Sept. 26, repairing road surfacing, walkways, 2 road washouts and road crossing, filling lagoon, St. Louis Co., Neg. 23-065-45-33.

LOW BIDDERS

California—State Div. Hys., Sacramento, Oct. 11, imported base material surfacing 7 mi. between Sandy Gulch Mill Pond and J. P. Lodge Road, Calaveras Co., from H. Sykes, Box 626, Patterson, **$47,650**; imprv. 1 mi. Kern Co., from R. W. Hampton Co., Inc., 4031 Goodwin Ave., Los Angeles, **$44,359.** 9/25—ENR 9/28.

Louisiana—Dpt. Hys., Baton Rouge, Oct. 11, imprv. 21.495 mi. Beauregard Parish, from W. R. Aldrich & Co., Leesville, **$232,111.** CD 9/27—ENR 10/5.

Louisiana—State Dpt. Hys., Baton Rouge, Oct. 4, imprv. 0.539 mi. Plaquemines Parish, from T. L. James & Co., Inc., Kenner, **$31,629.** CD 9/26—ENR 9/28.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, reconstructing state hy. in Mashpee, from D. J. Roach, 55 Spring St., East Bridgewater, **$60,210.** CD 10/2—ENR 10/5.

Mass., Boston—P. Wks. Dpt., City Hall Annex, Oct. 4, imprv. Pine Lodge Rd., Ward 20, etc., from Martin J. Kelly Co., Inc., 75 Stedman Rd., Jamaica Plain, **$32,825.** CD 9/21.

Mass., Boston—City, Dpt. P. Wks., City Hall Annex, Oct. 5, imprv. Alpha Rd., Ward 17, etc., from John McCort Co., 910 Huntington Ave., **$63,182.** CD 9/28.

Mass., Boston—City, Dpt. P. Wks., City Hall Annex, Oct. 9, imprv. Alaska, Brunswick, Copeland, Rock, Wabeno, Wabon and Waverly Sts., Ward 12, from E. M. Carriere, 134 Whitford St., Roslindale, **$26,617.** CD 9/20.

New Jersey—S. Miller, Jr., comr. State Hy. Dpt., Trenton, Oct. 9, imprv. 1.28 mi. Hudson Co., from Franklin Contg. Co., 20 Washington Pl., Newark, **$47,621**; 1.93 mi. Monmouth Co., from Standard Bitulithic Co., 50 Church St., New York, N. Y., **$44,139.** CD 9/27—ENR 10/5.

New York—H. A. Cohen, dir. Bureau Contracts & Accounts, State Dpt. P. Wks., Albany, Oct. 4, imprv. 4.13 mi. Access Rd., DA-SS-44-5, Orange Co., from N. D. Maselli Corp., Bloomfield, Conn., **$158,045.** CD 9/18—ENR 9/21.

Pennsylvania—J. U. Shroyer, secy. Hys., Harrisburg, Oct. 10, imprv. 0.24 mi. hy. Allegheny Co., from John F. Casey Co., Aspinwall St., Pittsburgh, **$85,765**; 0.2 mi. Northampton Co., incl. bridge, from C. Riebe, Lansford, **$36,387.** CD 9/29—ENR 10/5.

Virginia—State Dpt. Hys., Richmond, Oct. 10, imprv. 0.096 mi. York Co., from B. W. Jackson Contg. Co., 1009 W. Graham Rd., Richmond, **$125,266**; 1.266 mi. Nottoway Co., from Kent & Co., 2725 W. Broad St., Richmond, **$45,353.** CD 10/2—ENR 10/5.

Wis., Beloit—City, Oct. 10, concrete paving, curbing, guttering, grading, from Luety Bros., 1505 Prairie Ave., **$25,134.** W. A. Collins, city engr.

CONTRACTS AWARDED

Ia., Sibley — Bd. Supervs. Osceola Co., gravel surfacing various secondary roads, to J. Schumacker, Bancroft, **$41,970.** E. Winkel, Sibley, co. engr. Bids 10/9. CD 10/3.

Ill., Cicero—J. C. Stoffel, town clk., City Hall, imprv. 3.5496 mi. Projects 32, 34, 37 and 38-CS, to H. G. Goelitz & Co., 5757 Ogden Ave., **$122,851.** Bids 10/2. CD 9/26.

†Kan., Fort Leavenworth—U. E. Eng., 10 E. 17 St., Kansas City, Mo., 47,000 cu. yd. concrete paving, to Bonness & Bloomer, 1409 N. 27 St., Milwaukee, Wis., **$124,465.**

La., Lake Charles—C. W. Gabbert, secy. Calcasieu Parish Police Jury, approx. 1,376 lin. ft. 8 in. concrete road, etc., War Public Works Proj. 4A-16-263-N, to John W. Aldrich & Co., Kalwrah University Gardens, Baton Rouge, **$29,575.** Bids 9/26. CD 9/13—ENR 9/21.

LEADITE

The Pioneer Self Caulking Material for C. I. Pipe

TABLE OF COMPARATIVE QUANTITIES

Nominal Inside dia. of pipe, in.	Depth of Joint, Inches of Leadite	Approx. lbs. of Leadite per joint	Depth of Joint, Inches of lead	Approx. lbs. of lead per joint
4	2.5	2.00	2.25	8.56
6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.48
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	25.07
18	2.5	9.25	2.25	26.88
20	2.5	10.50	2.25	49.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	69.24
36	2.75	19.00	2.50	77.74
42	3.50	30.00	3.00	131.15
54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

THE LEADITE COMPANY
Girard Trust Co. Bldg. Philadelphia 2, Pa.

'o Caulking'

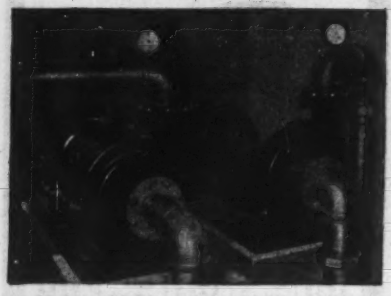
RYERSON

REINFORCING and STRUCTURAL STEELS IN STOCK

• Your nearby Ryerson plant carries complete stocks of all types of construction steels. Adequate facilities for cutting, bending, punching or otherwise preparing steels to meet your specifications are a part of our service. Ryerson men will be glad to work with you. Call: Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland Buffalo, Boston, Philadelphia, Jersey City.

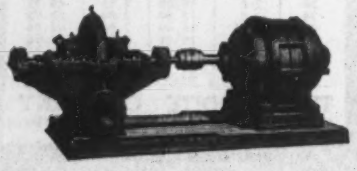
RYERSON STEEL-SERVICE

DEMING PUMPS



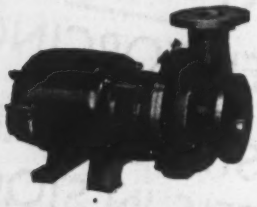
SIDE SUCTION CENTRIFUGAL PUMPS

These pumps can be furnished for belt, electrical motor, or gasoline engine drive. Sizes range from 1 to 10 inches with capacities from 10 to 3600 g.p.m. Single ball bearing and two ball bearing types. Ask for Bulletin 4200.



DOUBLE SUCTION CENTRIFUGAL PUMPS

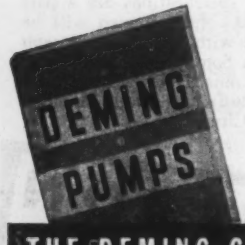
Horizontally split casing. Recommended for working pressures up to 200 pounds. Rotating elements in perfect static and dynamic balance. Vibrationless at all speeds. Sizes 1½ to 10 inches. Capacities up to 5000 g.p.m. at heads up to 350 feet. Ask for Bulletin 5003.



"MOTOR MOUNT" CENTRIFUGAL PUMPS

Compact, dependable, high efficiency, low cost units. Available in 63 sizes. Capacities range from 5 to 650 g.p.m. Complete details, specifications, and key to selection chart included in Bulletin 4301. Ask for it.

Send for 192 Page Catalog



Contains Engineering Data on All Types of Deming Pumps

THE DEMING COMPANY
SALEM • OHIO
PUMP MANUFACTURERS SINCE 1880

STREETS and ROADS Contracts Awarded (Cont'd.)

Minnesota—State Hy. Dpt., St. Paul, imprv. S.P. 8506-13 (Trunk Hy. 61-3), involving 144,983 cu. yd. excav., etc., between point 1.5 mi. west to 0.5 mi. east of the west corporate limits of Winona, to Nelson, Mullen & Nelson, 355 Gateway Bldg., Minneapolis, **$37,162.** Bids 9/29. CD 9/13—ENR 9/21.

★**New Jersey**—S. Miller, Jr., comr. State Hy. Dpt., Trenton. imprv. 1.593 mi., Warren Co., to Fred Berlanti & Son, Inc., 15 Oakland Ave., Harrison, N. Y., **$699,084.** CD 9/20—ENR 9/28, under LB.

New Mexico—State Hy. Dpt., Santa Fe, imprv. 28.421 mi. Roosevelt Co., to W. T. Bookout, Las Vegas, **$228,188**; 5.1 mi. Otero Co., to Gaastra & Gilbert, 1524 Las Lomas Rd., Albuquerque, **$38,636.** CD 10/3—ENR 10/5.

†**Tex., San Antonio**—U. S. Eng., Fort Sam Houston, repairing roads and streets in San Antonio Army Forces Depot, Serial W-41-154-45-30, to Collins & Bland Constr. Co., P. O. Box 1158, Austin, **$82,910.** Bids 10/6. CD 10/5.

★**Virginia**—State Dpt. Hys., Richmond, imprv. 4.5 mi. hy., constructing 4 bridges, Spotsylvania Co., to E. W. Hechler, R.F.D. 3, Richmond, **$518,874.** Bids 10/5. CD 10/10—ENR 10/12 under LB.

Que., Malartic—Dominion Malartic Mines, Ltd., Malartic, road construction, to Paquin Constr. Co., Ltd., c/o owner. Est. **$25,000.**

EARTHWORK, WATERWAYS

PROPOSED WORK

★**Mo., Robertson**—City of St. Louis, M. M. Kinsey, pres. and engr., Bd. P. Service, 304 City Hall, 12 and Market Sts., St. Louis, Zone 3, enclosing Cold Water Creek in rein.-con. tubes, main stream in twin tubes 4,800 ft. long, 15x10 ft. and tributaries in 11,600 and 4,800 ft. single tube at Lambert-St. Louis Municipal Airport. $1,400,000.

†**Nev., Lovelock**—Farm Security Admin., 30 Van Ness Ave., San Francisco, Calif., rejected bids Oct. 11, reconstructing Rodgers Dam and Fiume, near here, Contr. RDUA-1, Pershing Co. Will probably readvertise.

†**Ore., Bend**—Bureau Reclamation, Bend, bids soon canal crossings and removing plugs on 20 mi. sect. North unit canal, Deschutes Project.

B. C., Vancouver—Vancouver Victoria & Eastern Ry. & Navigation Co., c/o Great Northern Ry. Co., C. M. Nye, ch. engr., 175 E. 4 St., St. Paul, Minn., U. S. A., reclaiming land and constructing concrete retaining wall, $35,000.

Que., St. Ludger—Province of Quebec, Quebec City, flood prevention wall along North River. $35,000. Dpt. P. Wks., Quebec City, engr.

BIDS ASKED

Bids Asked October 24

B. C., Prince Rupert—Secy. Dpt. P. Wks., Ottawa, Ont., fishermen's floats and floating breakwater in Fairview Bay. About $40,000. Plans deposit $20.

Bids Asked October 25

Louisiana—Acadia-Vermillion Rice Irrigating Co., Inc., Bank of Commerce & Trust Bldg., Crowley, enlarging Ruth Canal from Bayou Teche to Vermillion River, involving approx. 240,000 cu. yd. excav. Plans deposit $20. Acadia and Vermilion Parishes.

Bids Asked October 26

†**Va., Norfolk**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., Boush Creek drainage project, Naval Operating Base, NOY 9011.

Bids Asked October 27

†**Louisiana**—U. S. Eng., foot of Prytania St., New Orleans, constructing approx. 146,000 cu. yd. earthwork, etc. on south bank Red River Levees, below Monncla, Avoyelles Parish, Solic. No. 16-047-45-30.

N. Y., Long Beach—H. A. Cohen, dir. bureau Contracts & Accounts, State Office Bldg., Albany untreated timber bulkheads, Atlantic Ocean, shorefront, between Maryland and Wyoming Aves., for State Dpt. P. Wks., Albany, C. H. Sells, supt. Plans deposit $2, J. J. Darcy, 385 W. Main St., Babylon, dist. engr. adv. ENR 10/19.

Bids Asked October 31

La., Venice—Plaquemine Parish Police Jury, Court House Bldg., Pointe-a-La Hache, constructing pump and engine foundation, dismantling present pump and engine unit, re-erecting same on new found. at power pump. sta. of Venice Drainage Dist. Plans deposit $25. J. C. De Armas, Jr., 8004 Hickory St., New Orleans, parish engr.

Bids Asked November 1

†**Neb., Hay Springs**—Farm Security Admin. War Food Admin., W. R. Young, ch. engr., 950 Bway., Denver, Colo., radial gates and radial gate hoists.

Bids Asked November 6

N. Y., Poughkeepsie—Bd. P. Wks., City Hall, constructing river intake pipe and control chamber. Plans deposit $25 if bid is submitted, $15 if bid is not submitted. M. Firnie, 25 W. 43 St., New York, Zone 13, consult. engr., adv. ENR 10/19.

DRAWING 6B to 9H
EXTRA B and
TRACING 1-2-3-4
specially developed for blueprint work

Strong smooth leads and uniform grading make Kimberly *THE* preferred drawing pencil.

Write Dept. E for free trial pencil. Mention your dealer. (This offer good only within U.S.A.)

Makers of Fine Pencils since 1889
General Pencil Compa
JERSEY CITY 6 ⊙ NEW JERSEY

Right down the Line

LOWELL

RED RATCHET WRENCHES

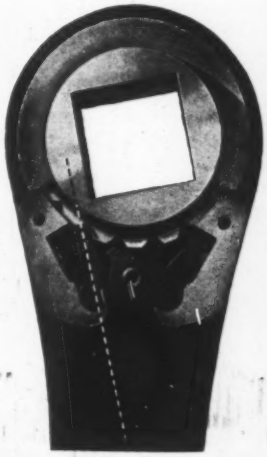
Prove their Worth

That SPEED and SAFETY are needed in Tunnel Work, Electric Tower Erection and in SHIPBUILDING, to-day, is an axiom. Heavy constructors doing a great variety of work need the best tools to complete jobs on time. So you encounter LOWELL Red Ratchet Wrenches on a wide diversity of heavy construction—evidence that successful contractors think alike about essentials.

Until the War is over, distributors' stocks may be short of LOWELL WRENCHES. In the meantime, note them down for your first Post-War orders.

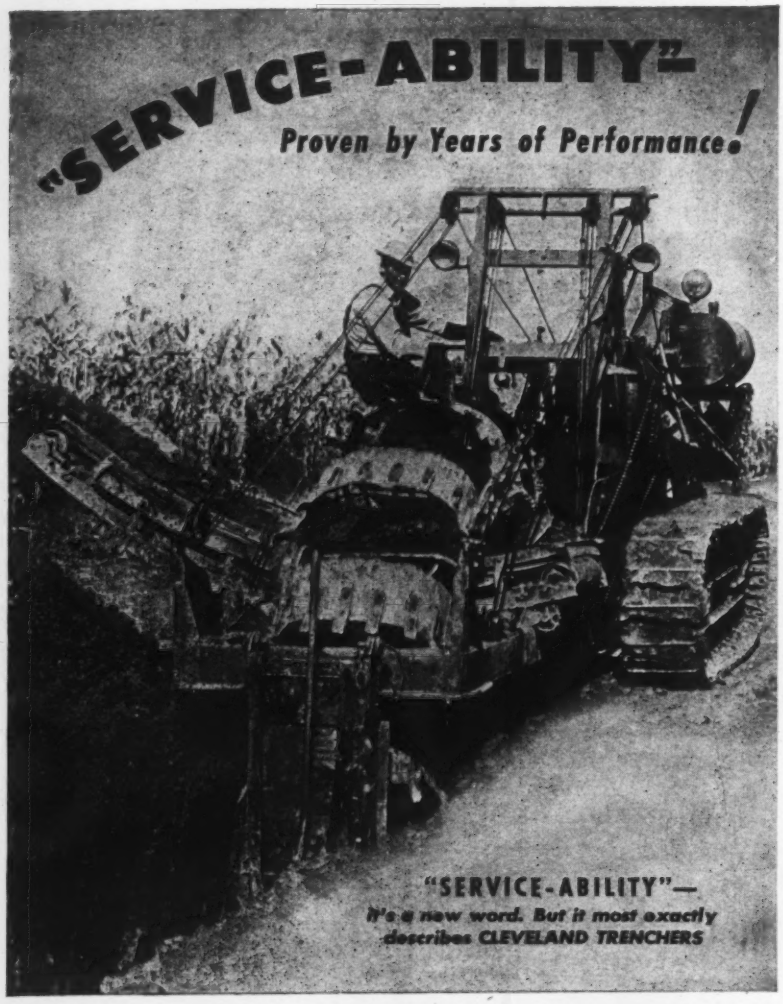
Straight Line LEVERAGE!

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear in a *straight line* and with a square contact. The pawl is in compression only —no shear, no tension, no torsion. The shipper carries none of the load. This strong construction insures steady service.



LOWELL WRENCH CO.
WORCESTER 8, MASS.

1869 1944



• Many "Clevelands" built 15 to 20 years ago are still on the job today doing their part to ease the manpower shortage. • Although out-moded by "Cleveland's" modern standards of performance, this evidences the soundness and correctness of the basic design pioneered by Cleveland. • It also tells the story of "Cleveland's" policy of rendering prompt repair parts service even on these old machines. • This kind of service and this kind of ability are two more reasons why "Clevelands" continue to be the profitable long range investment in the trenching machine field. Guarantee yourself this "Service-Ability" in your Post-War trenching jobs by using Clevelands.

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVE. "Pioneer of the Small Trencher" CLEVELAND 17, OHIO
"CLEVELANDS" Save More . . . Because they Do More

EARTHWORK, WATERWAYS Bids A (Cont'd.)

Bids Asked November 10

Mich., Pontiac—Oakl[and] Co. Drain Co[mm.], Court House, Pontiac, [Woo]dman, or [to] Drain Sec. 1, 4,200 ft. lo[ng], Sect. No. B, [2]ft. long, Sec. No. C, 2[,]000 ft. long, Sec. 3,712 ft. long, incl 14,9[00] cu. yd. open c[ut], 220 ft. 48 in. pipe culver[t], etc.

†Oklahoma—Bureau [of] Reclamation, A[ltus], 473,000 cu. yd. excav., [1,]977 cu. yd. con[c.], West Canal turnout, A[ltus] Main Canal, O plus 75.5 to Sta. 589 plus 25, Altus [Div.], adv. ENR 10/19.

Bids Asked November 15

†Oregon—Bureau of Reclamation, Dept. of Interior, H. W. Bashore, contr., Klamath Project, earthwork and structures, station 21 plus 50 to station 110 plus 95, station 119 plus 50 to station 382 plus 60 and station 384 plus 15 to station 600 plus 00, Klamath Straits drain outlet, Modoc unit, Tule Lake Division, Klamath Project, Oregon-California, 15 mi. south of Klamath Falls, Spec. [No.]

LOW BIDDERS

California—State Div. Hys., Sacramento, Oct. 11, stabilizing 0.1 mi. slide area at Big Bow, Humboldt Co., from E. B. Ha[mm.], Orland, **$69,073.** CD 9/25—ENR 9.28.

Calif., South Pasadena—Bd. Supervs., Los Angeles Co., Hall of Records, Oct. 18, reinforced concrete-lined section of Arroyo Seco Channel from R. A. Bell, 830 Orange Grove Ave., Sierra Madre, **$36,160.** A. [E.] Jones, Hall of Records, Los Angeles, engr.

Illinois—State Div. Waterways, 201 E. Monroe St., Springfield, Oct. 11, seawall at State Armory Bldg., architectural concrete hand rail incorporated in wall and cement for future installation of steel haid rail, to La Crosse Dredging Corp., 310 S. Michigan Ave., Chicago, **$60,282** and **$59,787** respectively. CD 10/2—ENR 10/5.

†Washington—At office Bureau Reclamation, Denver, Colo., Oct. 2, caisson [gate] and barge hoist for Grand Coulee [Dam], Spec. 1763-D, from Pacific Car & Foundry Co., Henry Bldg., Seattle, Zone 1, **$[5]**. CD 9/7—ENR 9/14.

CONTRACTS AWARDED

†Illinois—U. S. Eng., 816 U. S. Courts & Customhouse, 12 and Market Sts., St. Louis 2, Mo., repairing levees, incl. constructing 10 drainage structures, [and] 730,000 cu. yd. earth, etc., Neg. 23-065-4[5], Jackson Co., to Sternberg Dredging Co., Arcade Bldg., 806 Olive St., St. Louis, Mo. **$245,131.** Bids 9/27.

Okla., Coweta—U. S. Eng., 416 W[.] Bldg., Tulsa, Zone 2, levee repairs, Verdigris Drainage Dist. 1, Exten. 1 on Verdigris R[iver], Serial 34-066-45-12, to A. G. Sherwood Co[nst.] Co., Independence, Kan., **$21,680.** Bids [9/]. CD 1/10—ENR 1/13.

†Okla., Oologah—U. S. Eng., 416 W[.] Bldg., Tulsa, Zone 2, levee repairs, Co[o.] River, Lynn Bears private levee, Serial 34-066-45-14, to A. G. Sherwood Const. Co., Independence, Kan., **$16,160.** Bids 9/2[3].

†Okla., Tulsa—U. S. Eng., 416 W[.] Bldg., Zone 2, foundation drainage, [T]. and West Tulsa levees, Sect. A Arkansas River, Serial No. 34-066-45-11, force acct., **$21,000.** Bids 9/23 rejected.

†S. C., Charleston—U. S. Eng., 33 Cu[s]. house, maintenace dredging in Sh[ip] River, No. 38-081-45-4-Neg. to Atk[in] Dredging Co., Great Bridge, Va., [$1]. Bids 10/9.

†Washington—Bureau Reclamation, S. Harper, ch. engr., Denver, Colo., furn[ish] 2-leaf miter gate for drydock at Grand Coulee Dam, Columbia Basin Project, Spec. 1757-D, to American Bridge Co., 1st Nat. Bank Bldg., Denver, Colo., **$49,493.** Bids [9]. CD 9/18—ENR 9/21 under LB.

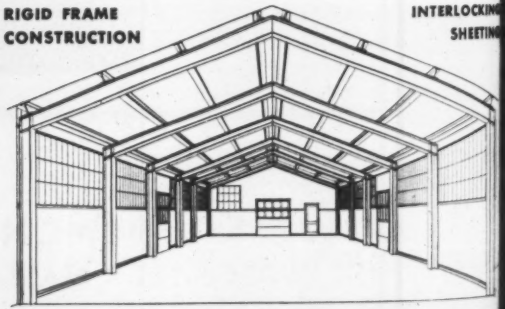
NATIONAL *Rigid Steel* STANDARD BUILDINGS

First in the Standard Prefabricated Field
Assures *Greater* Strength at *Less* Cost

- **PREDESIGNED** . . . in standard lengths, widths and heights.
- **ECONOMICAL** . . . in initial cost and maintenance.
- **FLEXIBLE** . . . adaptability to any needs.
- **PLAN YOUR RECONVERSION NOW** . . . check National Engineers on your future plans!

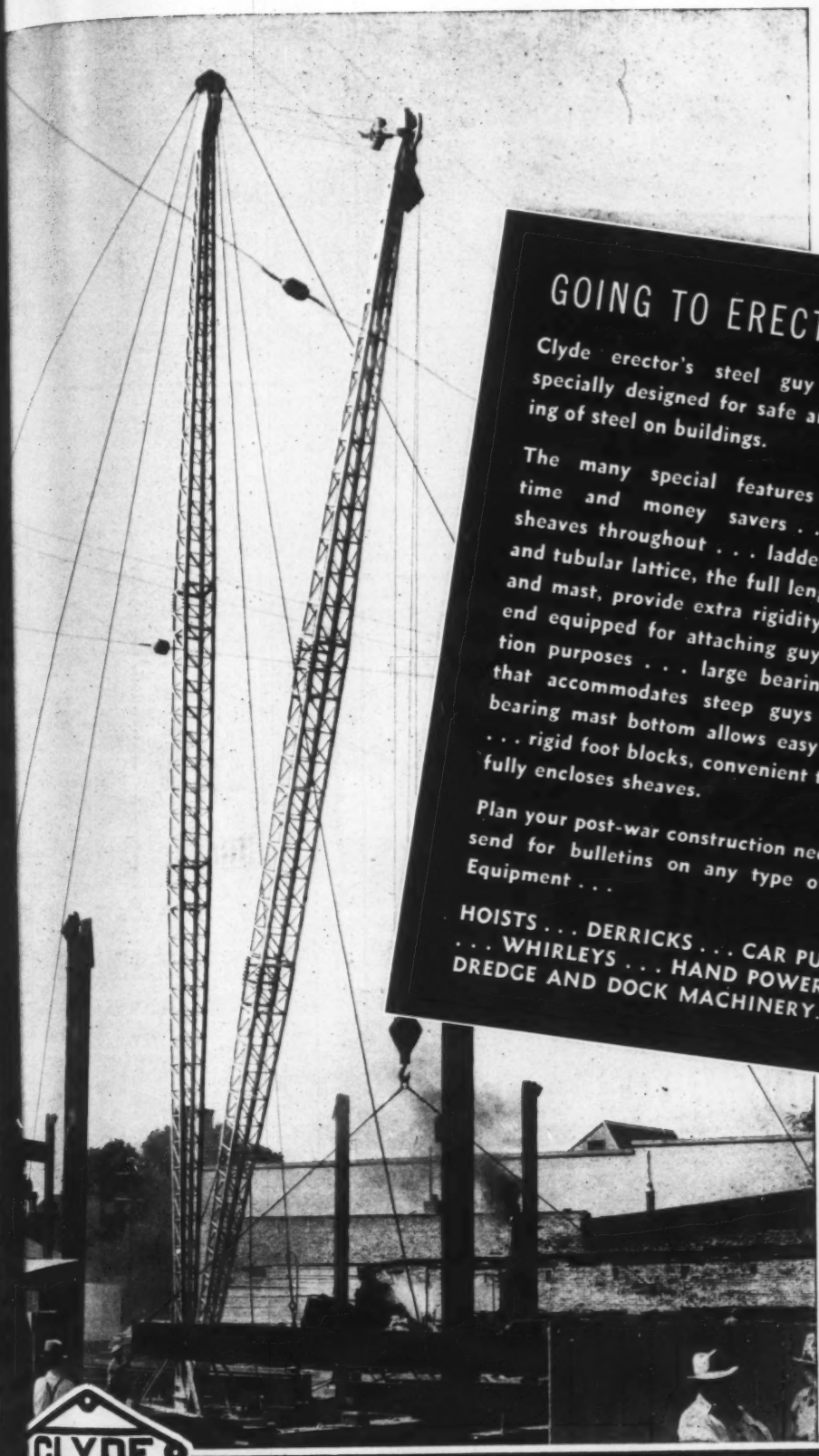
Write or Wire for Details!

RIGID FRAME CONSTRUCTION



INTERLOCKING SHEETING

NATIONAL MACHINE & FOUNDRY CO., 312 Sixth Avenue, Pittsburgh 22, Pa.



Plan now for the job you'll do tomorrow!

GOING TO ERECT STEEL?

Clyde erector's steel guy derricks are specially designed for safe and easy erecting of steel on buildings.

The many special features are proven time and money savers . . . self-oiling sheaves throughout . . . ladder type angle and tubular lattice, the full length of boom and mast, provide extra rigidity . . . boom end equipped for attaching guys for erection purposes . . . large bearing guy cap that accommodates steep guys . . . roller bearing mast bottom allows easy swinging . . . rigid foot blocks, convenient to handle, fully encloses sheaves.

Plan your post-war construction needs now, send for bulletins on any type of Clyde Equipment . . .

HOISTS . . . DERRICKS . . . CAR PULLERS . . . WHIRLEYS . . . HAND POWERS . . . DREDGE AND DOCK MACHINERY.

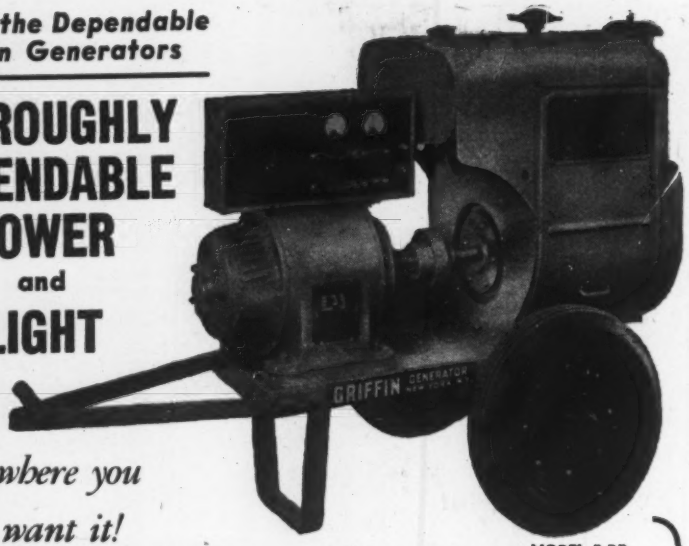
CLYDE

CLYDE IRON WORKS, INC.

DULUTH, 1 MINNESOTA

One of the Dependable Griffin Generators

THOROUGHLY DEPENDABLE POWER and LIGHT



anywhere you want it!

MODEL 5-DR

Steel tired wheels during the rubber shortage

Engineered and built to give you the same dependable Long Life as all Griffin products. Stands up under toughest usage on construction jobs. Simple design.

Gasoline engine is a standard well-known make; easily serviced; rugged; simple. Coupling is all-steel, running in a bath of oil. Generator is two-bearing, designed to take periodic overloads without damage. Two men can handle *anywhere* . . . one man, on a normally level surface. No gadgets to fool with. Just start the engine and plug in! Capacity 5 to 7½ K.W. If your job requires the operation of electric tools and motors or lighting, as, when, and where needed—here is your most economical equipment. It's one of the dependable Griffin products! Call or write for details.

MID-WEST

GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

SOUTH

GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE, 4, FLA.

MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.

GRIFFIN EQUIPMENT CORPORATION

LIFT with UNIT MOBILE CRANE

A single engine supplies both mobility and lifting power, with easy one man operation. All main machinery full enclosed in a one-piece cast gear case. Ask for complete data.

UNIVERSAL **UNIT** MACHINERY CORP Milwaukee 14 Wis.

LATIN AMERICA

Argentina, Buenos Aires—Republic of Argentina, Dpt. Irrigation, engr., Buenos Aires, plans irrigation program 1944-45, 20,440,000 pesos appropriated.

Argentina, Resistencia—Republic of Argentina, Buenos Aires, plans [illegible] houses, 1,000 pesos appropriated. Dpt. P. Wks., Buenos Aires, engr.

Mexico — Mexican Government, Manuel Avila Camacho, pres., Mexico City, plans factory. $600,000. Site not selected.

Mexico, Jalapa—Owner, c/o Martinez de la Torre, bids within 3 months, construction sugar factory. $500,000.

Mexico, Mexico City—National University, Rector Dr. Alfonso Caso, bids in January group University bldgs. in [illegible] Angeles $800,000.

Mexico, Mexico City—National University of Mexico, c/o A. Caso, Mexico City, plans fireproof bldgs. and allied facilities for expanded University City. $6,000,000.

PUBLIC BUILDINGS

PROPOSED WORK

†**Ala., Decatur**—Morgan Co. Bd. Revenue and Control, Decatur, health center, Alt. 1-291-N. $66,000. FWA.

†**Ariz., Phoenix**—School Dist. 14, Maricopa Co., Phoenix, constructing, equipping classroom school, and 2 story school addn., Ariz. 2-175-N. $51,710. FWA.

†**Calif., Benicia**—City, plans by H. J. Devine, Cronan Bldg., Sacramento, firehouse, Calif. 4-609. $18,860. FWA. CD 10/5—ENR 10/5.

†**Calif., Fontana**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 100 unit family portable shelter units, Calif. 4[illegible]

†**Calif., Los Angeles**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, plans by Flewellyn & Wing, Architects Bldg., 2[illegible] family dwelling units, Calif. 4904-N. CD 10/9—ENR 10/12.

†**Calif., Mare Island**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, plans by A. Roller, Crocker First National Bank Bldg., San Francisco, 250 family dwelling units, Calif. 4892-N. CD 10/5. ENR 10/12.

†**Calif., Oxnard**—Oxnard School Dist., Ventura Co., four 4 classroom schools, Calif. 4-653-F. $125,000. FWA.

†**Calif., Port Hueneme**—Pub. Housing Auth., 785 Market St., San Francisco, plans by Soule & Murphy, 116 E. Sola St., Santa Barbara, 170 family dwelling units, Calif. 4897-N.

★†**Calif., Richmond**—Pub. Housing Auth., NHA., 785 Market St., San Francisco, sketches by Miller & Warnecke, 1700 Financial Center Bldg., Oakland, remodeling [illegible] safing [illegible] United States Maritime Housing units and [illegible] dormitory bldgs., in Cutting Blvd., Ohio and Commercial St., $1,315,000. (**Correction**—status). CD 10/[illegible] under BA.

★**Calif., Vallejo**—Vallejo United School Dist., J. R. Alltucker, secy., 640 Carolina St., plans by H. J. Devine, Cronan Bldg., Sacramento, library and arts bldg. and torium and music bldg., at Vallejo High School; 10 room school, in Beverly Hills Dist.; small addns. to other schools. $700,000.

†**Calif., San Bruno**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, plans by A. Williams, Phelan Bldg., San Francisco, 175 temporary family dwelling units, Calif. 4891-N, housing civilian employees at Advance Base Personnel Depot.

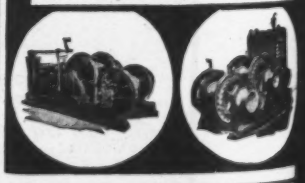
†**Calif., San Francisco**—Franciscan Sisters of the Sacred Heart, plans by M. A. Reid, Phelan Bldg., nurses' home, training facility at St. Joseph's Hospital, Park Hill and Buena Vista Ave., Calif. 4-667-N. $[illegible] FWA.

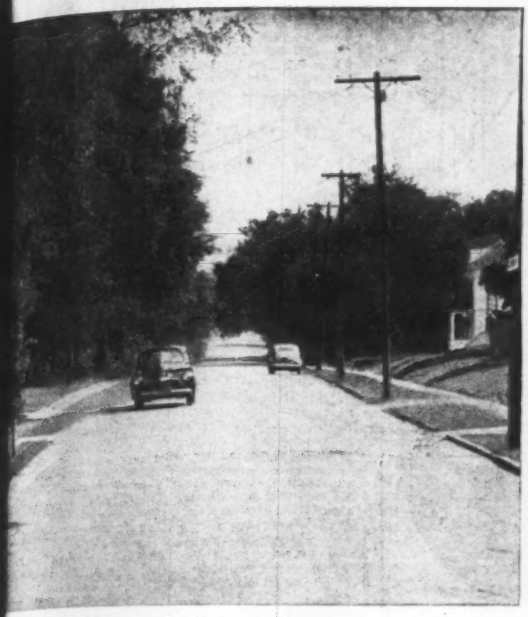
†**Calif., Santa Ana**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, plans by Marsh, Smith & Powell, 516 Architects Bldg., Los Angeles, 225 family dwelling units, Calif. 4898-N. CD 10/4—ENR 10/[illegible]

THOMAS HOISTS

FINEST QUALITY AT NO PREMIUM

THOMAS HOIST CO.
20 So. Hoyne Ave., Chicago, Illinois





Soil-cement on Frothingham St., in Lowell, Mass., which has over 13 miles of such modern paving. Picture taken September, 1944, shows why property owners are pleased with this prewar improvement program.

Johnsonville, S. C. road, first scientifically controlled soil-cement paving built in the United States. Recent picture shows road continuing to give fine service after nine years.

Soil-Cement

For Secondary Paving Programs

DEPENDABLE • ECONOMICAL

More than 37 million square yards of Soil-Cement paving in all parts of the United States is rendering economical service on light traffic roads, streets and secondary airports. It provides continuous, all-weather service at low annual cost.

Construction economy is inherent in Soil-Cement paving because it is about 90 per cent existing roadway material. Hauling and material costs are reduced to minimum.

Simplicity of construction results from easy mixing and dependable control of cement, moisture and density.

The superior value of Soil-Cement for secondary paving is demonstrated by its service record and by comparison with the cost and service of other types intended for the same purpose.

Make Soil-Cement the basis of your secondary paving program. Ask our engineers to help you on detail plans. Specific information on request.

Soil-Cement is ideal for new construction or for rebuilding and improving old granular-type secondary roads, streets and runways such as sand-clay, clay-gravel, crushed stone, gravel, lime rock, caliche or shell.

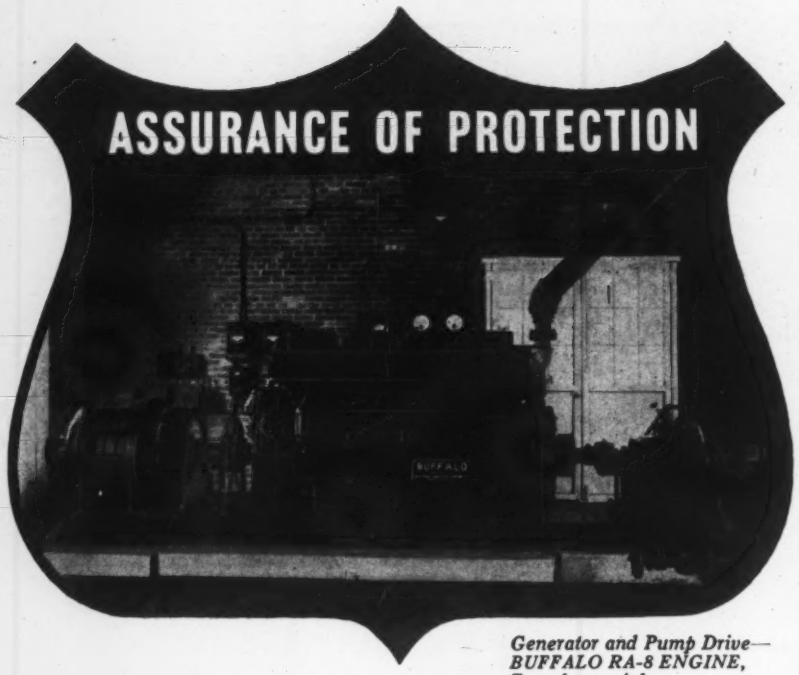
PORTLAND CEMENT ASSOCIATION

Dept. 10c-17, 33 West Grand Ave., Chicago 10, Illinois

National organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR BONDS

ASSURANCE OF PROTECTION



Generator and Pump Drive—BUFFALO RA-8 ENGINE, Texarkana, Ark.

A community—or an institution or industrial plant—whose fire protection has been made complete by a Buffalo Engine installation for stand-by pump enjoys a valuable privilege. Its fire insurance rates are less, returning many times the cost of the equipment.

But it is likely that in any community there are too few people who have full understanding of this protection. They are engineers who appreciate their design and construction—or operating men who know by experience the reliable starting and smooth-running, constant speed and uniform power delivery of Buffalo Engines.

Write for motor specifications for your files or for comparison—or for any other information that interests you.

BUFFALO GASOLENE MOTOR COMPANY

DEPT. NR-104 BUFFALO 13, N. Y., U. S. A.

BUFFALO ENGINES

ASSURANCE of PROTECTION

BUFFALO ENGINES — 100 H. P. THROUGH 750 H. P.— IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

PUBLIC BLDGS. Proposed W... (Cont'd.)

†**Conn., New Haven**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by J. F. Whitney, Belden Hill, Wilton, site imprvs., grading, drainage work, Conn. 6101.

†**Conn., New London**—Home Memorial Hospital, 541 Pequot Ave., plans by F. S. Langdon, 325 State St., brick, steel hospital bldg. $375,000. **FWA.**

†**Ga., Macon**—City, health center, Ga. 9-320-N. $60,000. **FWA.**

†**Ill., Seneca**—Federal Works Agency, 20 N. Wacker Dr., Chicago, plans by L. A. Gerding, Ottawa, 2 story, brick school, $95,000. CD 9/22—ENR 9/28.

Me., Calais—Municipality, A. R. English, city clk., high school, $200,000. F. A. Woodman, mayor.

Md., Baltimore—West Baltimore General Hospital, Inc., Rayner and Duke and Aves., nurses' home and training facilities, Md. 18-207-N. $250,000. **FWA.**

★†**Md., Fort Detrick (Frederick)**—U. S. Eng., 21 St. and Virginia Ave. N.W., Wash., 25, D. C., 1 and 2 story, brick concrete research bldgs. $900,000.

†**Md., Pomonkey**—Bd. Educ. Charles Co., 1 story, part bsmnt. school, incl. water supply and sewage disposal, Md. 18-226-N. $80,000. **FWA.**

†**Mass., Everett (br. Boston)**—Everett College Hospital, Everett, bids soon, nurses dormitory and training school Mass. 19196. $66,000. **FWA.** James H. Ritchie & Associates, 20 Newbury St., Boston, archt. CD 6/8—ENR 6/15.

†**Mass., Salem**—Salem Hospital, Highland Ave., plans by J. M. Gray, 175 High St. Boston, brick nurses home, Mass. 18-194-N. $35,000 **FWA** gr. CD 10/4—ENR 10/12.

†**Mich., Royal Oak**—School Dist. 4 Fractional, Royal Oak and Troy Twps., 2 story school addn., Mich. 20-372-N. $40,718. **FWA.**

†**Mich., White Lake Twp.**—School Dist. 7, White Lake Twp., 2 story school addn., Mich. 20-376-N. $38,000. **FWA.**

★†**Mich., Willow Run**—Packard Motor Car Co., 580 E. Grand Blvd., Detroit, plant bldgs. $725,000. Defense Plant Corp. will finance.

†**Minn., St. Paul**—Gillette State Hospital for Crippled Children, E. McGregor, supt., 1003 E. Ivy Ave., plans completed by E. D. Corwin, 813 Guardian Bldg., and bid soon, interior alterations brick hospital. $21,200. **FWA.**

★†**Mo., Kansas City**—St. Luke's Hospital of Kansas City, 44 and Mill Creek Sts., plans by Keene & Simpson, Land Bank Bldg., Kansas City, Mo., nurses home and hospital expansion, Mo. 23-286-N. $640,000. **FWA.** CD 10/4—ENR 10/12.

†**Mont., Billings**—St. Vincent's Hospital, Billings, plans by J. G. Link & Co., Electric Bldg., 3 story, bsmnt. nurses' home, Mont. 24-114-N. $249,910. **FWA.** CD 10/4—ENR 10/12.

†**Mont., Butte**—St. James Hospital, Butte, plans by J. G. Link & Co., Electric Bldg., Billings, altering bsmnt. of nurses' home, Mont. 24-113-N. $5,000. **FWA.**

†**Mont., Helena** — St. John's Hospital, Helena, plans by E. B. Benson, 631 N. Rodney St., 3 story, brick, nurses' home addn., Mont. 24-111-N. $76,971. **FWA.** CD 10/4—ENR 10/12.

†**Mont., Missoula**—St. Patrick's Hospital, Missoula, plans by H. E. Kirkemo, Kalispell, 3 story, bsmnt., rein.-con. nurses' home, Mont. 24-115-N. $300,000. **FWA.** CD 10/4—ENR 10/12.

Neb., Fremont—Dodge Co., D. J. Arundel, clk., $146,000 bond election Nov. 7, repairing and enlarging county hospital. $173,610. Plans application to FWA. John Latenser & Sons, 1507 Farnham St., Omaha, archts.

Neb., Fremont—Bd. P. Wks., Fremont, light plant addn., imprvs. incl. new generator and new boiler units, altering plant bldg. $428,724. Black & Veatch, 4706 Bway., Kansas City, Mo., engrs.

Electric Welded Steel Pipe...

For Permanent Installations

Easy to install—High capacity
Thoroughly dependable

ALCO

American Locomotive

ALCO PRODUCTS DIVISION

30 Church Street, New York 8, N. Y. • Dunkirk, N. Y.

THE MOUNT VERNON BRIDGE CO.

Engineers Contractors

STRUCTURAL STEEL

RAILWAY AND HIGHWAY BRIDGES

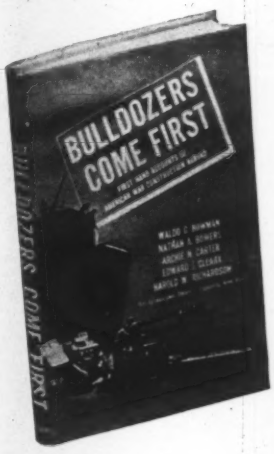
BUILDINGS AND VIADUCTS

MOUNT VERNON, OHIO

Now—the story of U.S. war construction in foreign lands

U. S. Marine Corps Photo

Eyewitness accounts of the great engineering works needed in modern war and achieved in the face of wartime obstacles and in battle-ridden locales.



Read the fascinating and informative details, and amusing sidelights, on:

- The miraculous work of Army Engineers in providing operational bases and shelter for U. S. forces in Britain
- The records made in Africa with Arab hand labor combined with modern construction equipment
- Creating the Russian supply line through Persia and keeping it open
- Carrying war materials over the crags and tundra of Attu
- Pushing roads and bridges at record speed through the Canadian wilderness
- Transportation and building feats on the "little land and much water" of the South Pacific
- Winning rubber and strategic minerals from the depths of South America

Where does the engineer go in today's war? What does he have to do? How does he do it?

This book gives you the story of the work of civil engineers and construction men in the forefront of the war effort, building the vitally important means of attack and defense, access and supply, in a war that has eclipsed all others in the speed of movement and scope of operations of fighting forces.

Just Published

BULLDOZERS COME FIRST

By Waldo G. Bowman, Nathan A. Bowers
Harold W. Richardson, Edward J. Cleary, and Archie N. Carter
War Correspondent Editors, Engineering News-Record

278 pages, illustrated by photos, chiefly taken by the authors, $2.75

WORKING under any or all the disadvantages of the unusual conditions and materials encountered in unfamiliar localities, of sanitation and labor problems, transportation difficulties, supply and equipment shortages, the unprecedented pressure of wartime demands, and even the bombs and gunfire of the enemy, our engineering forces, both military and civilian, have registered a truly amazing record of accomplishment.

Here — absorbing, inspiring — is the account of their accomplishments in many theaters of the war, brought to you in the words of skilled technical reporters.

10 days' examination—Send this McGRAW-HILL coupon

McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 18, N. Y.

Send me Bowman, Bowers, Richardson, Cleary and Carter's Bulldozers Come First, for 10 days' examination on approval. In 10 days I will send $2.75, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....

Address ..... Position .....

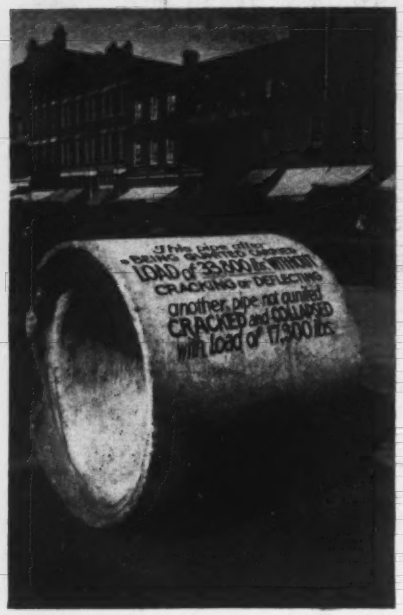
City and State ..... Company NR-9-21-44

(Books sent on approval in U. S. and Canada only.)

CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



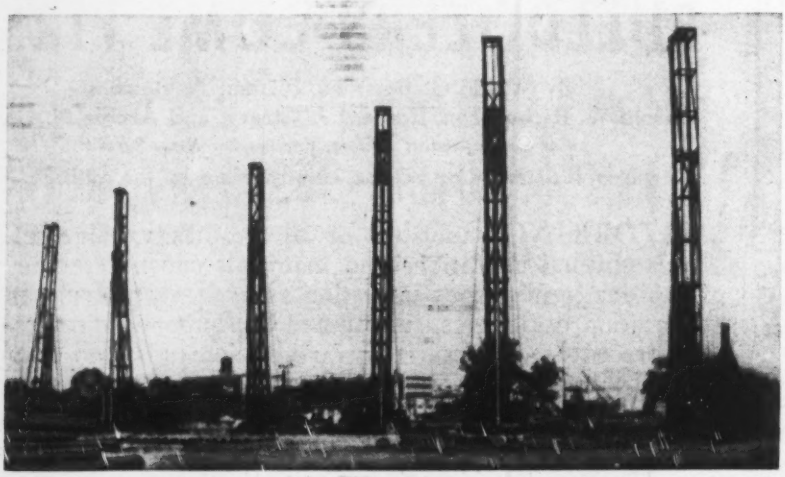
THOUSANDS OF DOLLARS SAVED WITH "GUNITE"

The photo shows a section of pipe taken from a sewer, about half a mile long and built of 36" and 48" concrete pipe, at Owen Sound, Ont., Canada. Within six months, the pipe cracked almost the entire length and the city was faced with the very expensive prospect of re-opening the streets.

Exhaustive tests indicated that the sewer could be repaired with reinforced "GUNITE" without removing it. This was done (by our Canadian company, Gunite and Cement Gun Contracts, Ltd.,) at a saving of many thousands of dollars and weeks of time.

See our Bulletin 2200 for other examples of sewer work and many other economical uses of "GUNITE."

MANUFACTURERS OF THE "CEMENT GUN"



WESTERN

WESTERN FOUNDATION CO. DRILLED-IN CAISSON CORP.

WESTERN CONCRETE PILE CORP.

308 W. WASHINGTON ST., CHICAGO, ILL. 155 EAST 42ND ST., NEW YORK, N. Y.

PUBLIC BLDGS. Proposed Work (Cont'd

†**N. J., Dover**—U. S. Engr., 126 Wall New York 5, N. Y., metal testing laboratory bldg. at Picatinny Arsenal. $50,000.

†**N. J., Princeton**—Heyden Chemical Cor 50 Union Sq., New York, N. Y., addn. bldgs. Approx. $80,000. Defense Plant Cor will finance.

†**Ore., Astoria**—Pub. Housing Auth., NH Skinner Bldg., 5 Ave. and Union St., Seattl 1, Wash., plans by Wicks & Wicks, Astor 20 unit housing for families of Naval Pe sonnel, Ore. 35302-N. CD 10/10—ENR 10/

†**O., Brooklyn (P. O. Cleveland)**—Bd. Edu Brooklyn Village School Dist., 9700 Biddu Rd., school, Ohio 33-300-P. $81,444. FW CD 5/26—ENR 6/8.

†**Ore., Beaverton**—School Dist. 48 Wash ington Co., plans by Freeman & Hayn Postal Bldg., Portland, brick school addn Ore. 35-179-N. $60,000. FWA. CD 10/ ENR 10/12.

†**Ore., Portland**—School Dist. 29, Mul nomah Co., school addn., Ore. 35-190- $49,800. FWA.

†**Ore., Sutherlin**—School Dist. 130, Dou las Co., school addn., Ore. 35-146-N. $60,1 FWA.

Tex., Houston—Independent School Dis c/o University of Houston School Bd., St. Bernard St., plans by L. Q. Cato, W. Gray Ave., college bldgs., etc. $150,00

†**Pa., Allentown**—Consolidated Vultee Air craft Corp., Allentown, addnl. plant bldg $350,000. Defense Plant Corp. will finan

★**Va., South Norfolk**—Dpt. P. Wks., C Hall, plans by Rudolph, Cooke & W Leeuwen, Monticello Bldg., Norfolk, hospi stadium, health center, fire station a maintenance. $500,000.

†**Wash., Forks**—Pub. Housing Auth., NH Skinner Bldg., 5 Ave. and Union St., Seat Zone 1, plans by McClelland & Jones, P public Bldg., Seattle, Zone 1, 20 unit ho ing for families of Naval Personnel, Wa 45277-N. CD 10/5—ENR 10/12.

†**Wash., Oak Harbor**—Pub. Housing Au NHA, Skinner Bldg., 5 Ave. and Union Seattle, Zone 1, plans by Stuart, Kirk Durham, 4 and Cherry Bldg., Seattle, Z 4, 50 unit housing on Whidbey Island families of Naval personnel, Proj. 45270 CD 10/5—ENR 10/12, under Anacor Whidbey Island.

†**Wash., Pasco**—Pub. Housing Auth., NH Skinner Bldg., 5 Ave. and Union St., Seat Zone 1, plans by Bain Brady, Naramore Johanson, Smith Tower, Seattle, Zone 4, unit housing for families of Naval pe sonnel, Wash. 45279-N. CD 10/5—E 10/12.

†**Wash., Port Blakely**—Pub. Housing Au NHA, Skinner Bldg., 5 Ave. and Union Seattle, Zone 1, plans by Jones, Bouill Thiry & Syllaasen, Hoge Bldg., Seat Zone 4, 20 unit housing, Bainbridge Isla for families of Naval personnel, Pr 24383-N.

†**Wash., Seattle**—Pub. Housing Au NHA, Skinner Bldg., 5 Ave. and Union Zone 1, plans by Jones, Bouillon, Thiry Syllaasen, Hoge Bldg., Zone 4, 130 u family housing, for families of Naval pers nel, Wash. 45280-N. CD 10/5—ENR 10/

†**Wash., Shelton**—Pub. Housing Au NHA, Skinner Bldg., 5 Ave. and Union Seattle, Zone 1, plans by Morrison & Jan sen, 719 2 Ave., Seattle, Zone 4, 20 u family housing for families of Naval p sonnel, Proj. Wash. 45276-N. CD 10/ ENR 10/12.

Que., Granby—J. Lemieux, secy., Gra Catholic School Comn., soon lets contr school and residence for teachers. $150, plus. R. Blanchet, 53 d'Auteuil St., Que City, archt. CD 7/13—ENR 7/27.

Alaska, Anchorage—City, M. Andre mayor, City Hall, plans by W. A. Mar Anchorage, gymnasium and classroom ad $280,000. Seeking FWA. aid.

Ont., Cochrane—Province of Ontario, ronto, experimental and research pl $50,000. Dpt. P. Wks., Toronto, engr.

★**Ont., Ottawa**—Dominion Govt., Otta plans by Dpt. Mines & Resources, Otta metallurgical laboratory exten., Booth $730,000. Dpt. P. Wks., Ottawa, engr.

Ont., Stratford—City of Stratford Gen Hospital Bd., clinical laboratory, and general hospital. $250,000.

★**Ont., Toronto**—Municipality, c/o Tow Housing Bd., City Hall, preparing pl Moss Park slum clearance and construc dwellings for 800 families. $5,300,000.

BIDS ASKED

Bids Asked October 12

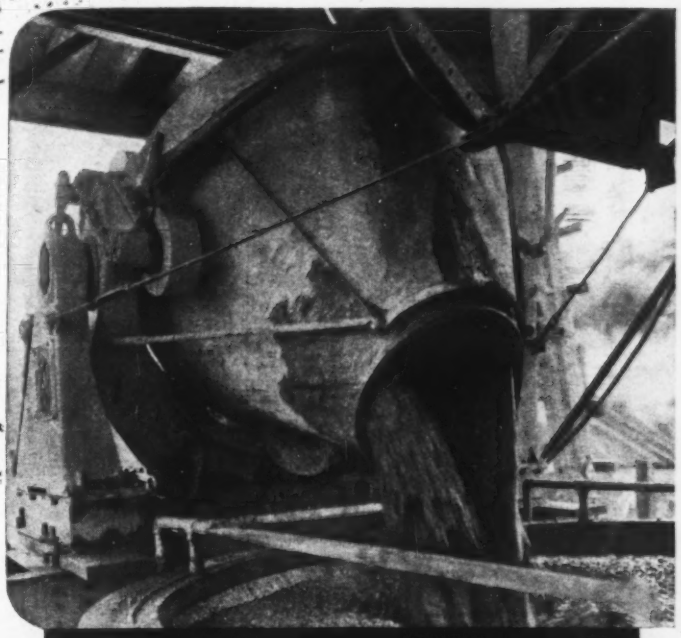
†**R. I., Newport**—Pub. Housing Auth., N 24 School St., Boston 8, Mass., compl Park Holm housing R.I. 5-1 and Tonomy housing R.I. 37012. $15,000.

Va., Williamsburg—College of William Mary, C. Duke, Bursar, Williamsburg, s and hot water distr. sys., imprvs. $8 Plans deposit $15. Extended date. Wi Wilson, 907 Peoples Bank Bldg., Lynchb engrs. CD 9/13—ENR 9/21.

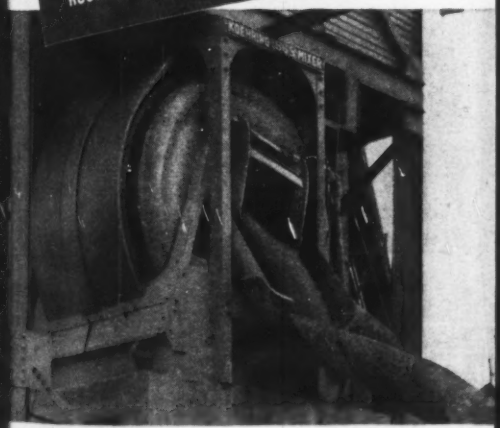
Bids Asked October 16

Mich., Dearborn—H. S. Mitchell, bus. at Fordson High School, 5757 Neckal 1 story, 5-classroom school bldg. Plans posit $15. Jensen & Keough, 14478 Cousens Hwy., Detroit, archts.

QUALITY CONCRETE AT RECORD SPEED



DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.



RECORD POURING WITH KOEHRING

Koehring Tilting and Non-Tilting Mixers have established pouring records on many large volume concrete jobs . . . dams, spillways, locks, bridges, power plants, drydocks, etc. for both peace and wartime projects. Koehring Construction Mixers have specially designed non-clogging drums and drum interiors to produce thoroughly mixed, quality concrete. They are substantially constructed to operate day and night continuously for maximum yardage production. *Plan now* for a Koehring Mixer for postwar construction. Consult our distributor or write to us for information.

KOEHRING COMPANY

Milwaukee 10, Wisconsin

KOEHRING HEAVY DUTY

ARMY E NAVY

Member Mixer Bureau Affiliated with A. G. C.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

LUFKIN

"PEERLESS"
CHROME CLAD
STEEL TAPE

THIS TAPE HAS EVERYTHING!

You'll go a long way before you'll find a better, all-around steel tape than the sturdy Lufkin "Peerless." The ¼ inch line has jet black markings that are easy to read against a satin chrome surface that won't rust, crack, chip or peel. Sturdy four arm metal frame and smooth winding mechanism help make it an ideal steel tape for engineers who want the best. See the "Peerless" at your dealers and write for complete Lufkin catalog.

BUY THROUGH YOUR DEALER

LUFKIN
PRECISION TOOLS • TAPES • RULES
SAGINAW, MICHIGAN NEW YORK CITY

PUBLIC BLDGS. Bids Asked (Cont'd.)

Bids Asked October 25

†**Kan., Kansas City**—Douglas Hospital, F. E. Kitchen, supt., 27 and Grant Sts., hospital addn., alterations, Kan. 14-254. $160,000. **FWA.** Bids 9/27 rejected. Bloomgarten & Frohwerk, 911 Walnut St., Kansas City, Mo., archts. W. L. Cassell, 912 Baltimore St., Kansas City, Mo., mechanical engr. CD 9/18—ENR 9/21.

★†**Md., Bethesda (br. Wash., D. C.)**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., research bldg. and animal housing, Naval Medical Center, NOY 9280. $1,000,000. CD 10/2.

Bids Asked October 27

†**Wash., Wenatchee** — Bonneville Power Admin., P. O. Box 3537, Portland, Ore., rein.-con. control house and oil house, at Columbia switching station site near Rock Island on Columbia River, Inv. 3250. Plans deposit $25.

Bids Asked October 30

N. S., Sydney—Secy. Dpt. Munitions & Supply, Ottawa, Ont., stores bldg. at Naval Base, for Dpt. Natl. Defense (Sea), Ottawa, Ottawa, Ont. 70,000.

†**Wash., Moses Lake**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., 25, D. C., altering, improv. recreation center, Wash. 45-258. **FWA.** CD 10/1—ENR 10/7.

Bids Asked November 3

N. Y., Brooklyn—At office Executive Director, The Port of New York Auth., 111 Eighth Ave., New York, Zone 11, reconstructing explosion walls of grain elevator bldg. and cleaner house of Port Authority Grain Terminal, foot of Columbia St., at Gowanus Bay. Plans deposit $10. T. C. Ferguson, chn., adv. ENR 10/19.

†**R. I., Newport**—Federal Works Agency, 99 Chauncy St., Boston, Mass., 2 story recreation bldg., dormitory addn., W. Bway. $45,000. Noel & Miller, 6 Catherine St., archts. CD 9/21—ENR 9/28.

B. C., Esquimalt—Secy. Dpt. Munitions & Supply, Ottawa, Ont. supplying, installing boiler plant, compressor plant and Steam and Airlines Bldg. 190. H. M. C. Dockyard, for Dpt. National Defense (Sea) Ottawa, Ont. $75,000.

LOW BIDDERS

†**N. J., Lyons**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., 25, D. C., Oct. 10, Storehouse Bldg. 13 addn., Project 2325, from Arthur Venneri Co., 259 N. Broad St., Elizabeth, $74,236. CD 9/11—ENR 9/14.

†**Va., Arlington** — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., Oct. 11, addnl. housing, recreational facilities, for Marine Corps Women's Reserve, Spec. 14501, NOY 10059, from National Structures Corp., 804 Kennedy St. N.W., Wash., D. C., $318,000. CD 10/2—ENR 10/5.

†**Wis., Merrimac**—U. S. Eng., 408 Federal Bldg., Milwaukee, Oct. 6, interior electric work at Badger Ordnance plant, from Havey Elec. Co., Construction Office, Madison, $53,536. Hercules Powder Co., 908 Market St., Wilmington, Del., will cperate. Mason & Hanger Co., 500 5 Ave., New York, N. Y., engr.-archt.

CONTRACTS AWARDED

†**Colo., Denver**—U. S. Eng., 909 17 St., 1 and 2 story, rein.-con. bldg., modification 6 bldgs., covered ramps, installing equip. and railroad trackage for addnl. loading facilities, to Kershaw, Swinerton & Walberg, c/o Rocky Mtn. Arsenal. Est. over $300,000.

†**Calif., Hunters Point**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., 25, D. C., mold loft and cable storage bldg., Naval Drydocks, NOY 10586, to Peter Kiewit Sons Co. & Haas Constr. Co., 442 Post St., San Francisco, Zone 2, $285,132.

★†**Calif., Port Chicago**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., personnel structures, at Inland Storage area, Naval Magazines, Spec. 14732, NOY 10314, to MacDonald & Kahn, Inc., 200 Financial Center Bldg., San Francisco, $1,639,361. CD 10/10, under LB.

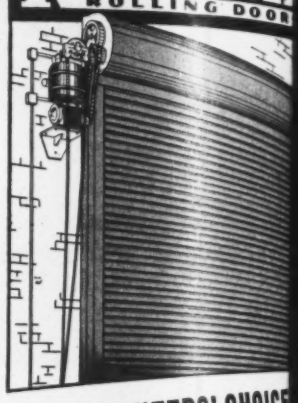
★†**Calif., San Diego**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., addnl. covered storage, Naval Repair Base, Spec. 14647, NOY 10220, to Gorelnik Co., 1220 La Brea Ave., Los Angeles, $654,846. Bids 10/5. CD 10/10, under LB.

†**Ill., Decatur**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Zone 6, dismantling 60 houses at Rosiclare, transporting and re-erecting same here, Ill. 11219, to Kroening Engineering Corp., 4500 W. Mitchell St., Milwaukee, Wis., $192,680. Bids 9/11. CD 9/6—ENR 7/27, under Springfield-Decatur.

†**Minn., Minneapolis** — R. S. Fallawan, purch. agt. State Bd. Regents, University of Minn., Administration Bldg., Main Campus, W. T. Middlebrook, comptroller, general contract 6 story, brick, tile nurses training home and school, exten., altering hospital service wing, etc., to Hagstrom Constr. Co., 130 N. Snelling Ave., St. Paul. $367,665. **FWA.** Bids 9/28. CD 9/20—ENR 8/10.

†**Mo., St. Louis**—National Carbon Co., Inc., Madison Ave. and W. 117 St., Cleveland, O., altering 2 bldgs., 2 service bldgs., 1 garage and 1 solvent storage bldg., for mfg. plant, 4417 Oleatha Ave., St. Louis Zone 10, to Gillmore, Carmichael, Olson Co., 1873 E. 55 St. Cleveland, O. Est. $60,000. Defense Plant Corp. will finance.

KINNEAR
ROLLING DOORS



The ENGINEERS' CHOICE

With technical men who *know* Kinnear Rolling Doors have been first for years. Engineers recognize the extra advantages of Kinnear Rolling Doors and *Kinnear door engineering service.* Accurate, detailed drawings are always supplied. Factory-trained crews are available to handle complete installation. And the durability of the rugged Kinnear interlocking-slat construction has been proved over long periods of continued faithful service. The Kinnear Mfg. Co., 1820-1860 Fields Ave., Columbus 16, Ohio.

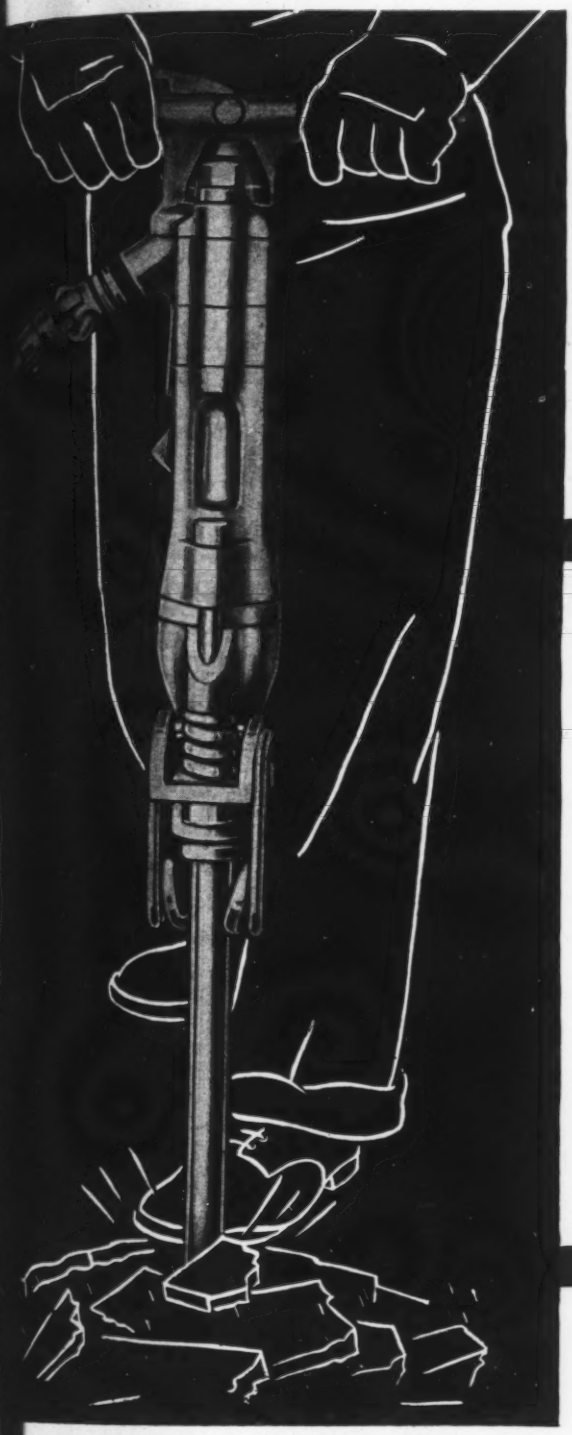
Offices and agents in all principal cities.

STACKS

Designed for quality, economy and long life. Fabricated from carbon steel or wrought iron.

Consult Lancaster's experienced engineers when you have a problem in fabricated steel plate work. Complete designs and estimates submitted with no obligation to you. Write, phone or wire today.

LANCASTER IRON WORKS, INC.
Lancaster, Penna.



for the toughest demolition jobs

CP - 117 DEMOLITION TOOL

OPERATING without kick-back and requiring no riding, the CP-117 is recommended for use on hard cement and similar hard-to-extremely-hard materials. Valve actuated and exceedingly easy to handle, it is the most popular demolition tool in the entire Chicago Pneumatic line. Economical in air consumption and low in maintenance, the CP-117 fulfills the most exacting requirements for speedy demolition work.

CP No. 117 Demolition Tool is only one of the large Chicago Pneumatic line of Demolition Tools, Sinker Drills, Drifters, etc. Write for complete details.

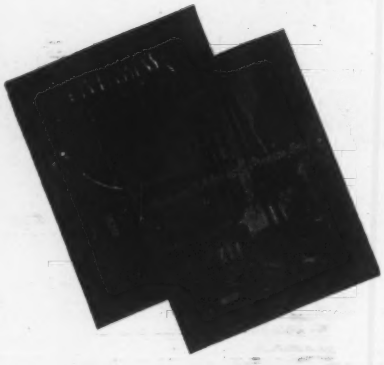
★★★★★★
ATIC TOOLS
RIC TOOLS
ULIC TOOLS
K DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

FOUNDATIONS

PRETEST UNDERPINNING
CONCRETE-STEEL PILES
MASS CONCRETE CONSTRUCTION
HEAVY SHORING
DRILLED-IN CAISSONS



Send for catalogs descriptive of the latest foundation types and methods

SPENCER, WHITE & PRENTIS, INC.
10 EAST 40th ST. NEW YORK 16, N. Y.

CLIP THIS ADVERTISEMENT

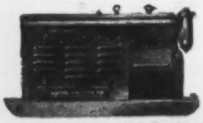
Send for literature on items checked

☐ Gas or Electric Concrete Vibrators to meet every placing requirement

☐ Concrete Surfacing Attachments for all needs

☐ Vibratory Concrete Finishing Screeds . . . Models: VS-6 ft.; VS-10 ft.; VS-13 ft.; VS-16 ft.; VS-20 ft.; VS-25 ft. adjustable for lengths . . . strike off and compaction in one easy operation.

☐ Portable AC or DC Gas Electric Generator Sets to meet all power, lighting requirements. ½ to 17 KW. Open or housed models.



SPEED YOUR WORK
SAVE MANPOWER
with Master Equipment
"PREFERRED THE WORLD OVER"

Power, portability, simplicity and built-in dependability distinguish all Master Vibrator Company equipment . . . make it the choice of thousands of engineers and contractors wherever work must be done fast, efficiently and at lowest operating and manpower cost. *Immediate delivery.*

Write for literature at once!

☐ Full line of Flood and Shovel Lights (not illustrated).

☐ Electric "Power Blow" Hammer and Tools for heavy or light duty work. Model 650 Generator Plant to operate hammer when electricity not available.

MASTER VIBRATOR COMPANY
Dayton 1, Ohio • Distributors throughout United States and Canada

Products Include: Concrete Vibrators, Gas or Electric Surfacing Attachments, High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Electric or Gas Engine Driven Power Blow Hammers

PUBLIC BLDGS. Contracts Awarded (Con.)

†N. J., Bridgeton—Bd. Educ. Upper Deerfield Twp., Bridgeton, school addn., N. J. 28-179-N, to Progressive Builders, Inc., Cooper St., Camden, $70,000. **FWA.** 9/12. CD 9/1—ENR 9/7.

†Pa., Phila.—Yards & Docks, Navy Dept., 18 St. and Constitution Ave. N.W., Wash., D. C., locomotive and crane repair shop, Navy Yard, NOY 8553, to Frank V. Warren, Inc., Lewis Tower, 15 and Locust Sts., $266,513.

†Tex., San Antonio—U. S. Eng., Fort Sam Houston, alterations, addns. to Warehouses 100 and 101, for San Antonio Army Service Depot, Serial W-41-154-45-23, to F. L. Scott & Son, 123 Beal St., $52,702. CD 9/28—ENR 9/28.

†Wis., Kenosha—Nash-Kelvinator Corp., 5626 25 Ave., 1 story, 200x250 ft., brick, steel Factory Bldg. 39 addn., concrete fdn., Permanent Const. Co., W. Capitol Dr. and N. 3 St., Milwaukee, Zone 12. Defense Plant Corp. will finace. Bids 10/3. CD 9/25—ENR 9/28.

Ont., Toronto—Wartime Housing Ltd., H. York St., 100 temporary houses on fringe of city-owned park lands, to John Maguire Contracting Co. Ltd., 24 Birch Ave., about **$320,000. CD 9/27—ENR 10/5.**

COMMERCIAL BUILDINGS

PROPOSED WORK

Del., Wilmington—Roddy & Kennedy, engrs. and archts., 1710 Webster Ave. N.W., Wash., D. C., soon lets contract, church, for St. Elizabeths Roman Catholic Church, Broad and Oaks Sts. $150,000 or more.

Ind., Anderson—South Anderson Development Co., 3705 Main St., 25 or more residences. $150,000.

Ind., Richmond — St. Paul's Lutheran Church, 333 S. 7 St., sketches by H. A. Brand, 400 W. Madison St., Chicago, Ill., brick, stone, rein.-con., steel church. $150,000.

★**Mich., Detroit**—St. Scholasticas R. C. Parish, 17355 Southfield Rd., plans by G. F. Diehl, 120 Madison Ave., brick, steel, rein.-con. church, convent addn., school addn. $500,000.

★**N. J., North Arlington (br. Arlington)**—Len Home Builders, Inc., 46 Ridge Rd., plans by B. Sumner Gruzen, 921 Bergen Ave., Jersey City, 200 suite, 2 story, brick veneer, irregular sized garden apartment, $1,000,000 $2,000,000.

★**N. J., Nutley**—Canterbury Gardens, 21 Ditmars Ave., Brooklyn, N. Y., plans by E. Gerber, 367 Fairview Ave., Orange, 2 and 3 story, brick, garden apartment bldg. $500,000.

N. Y., Rhinecliff—Cardinal Farley Military Academy, Rhinecliff, soon lets contract, dining hall and laboratory bldg. Eggers & Higgins, 542 5 Ave., New York 19, archt.

★**O., Shaker Heights (br. Cleveland)**—M. Marmorstein, Guardian Bldg., Cleveland, plans by M. H. White, 750 Prospect Ave., Cleveland, office, commercial and theatre bldg. $500,000.

Pa., Bustleton (sta. Phila.)—Bustleton M. E. Church, W. B. Cormly, treas. Church Bldg. Funds, plans by H. W. Castor, 1107 Walnut St., Phila., church, Bustleton Ave. near Welsh Rd. $150,000.

Tex., Dallas—Interstate Circuit, Inc., Majestic Bldg., theater, Inwood Rd. and Lovers Lane. Site purchased.

Utah, Brigham City—Bushnell Homes, Inc., c/o S. W. Winburn, archt., 519 Beason Bldg., Salt Lake City, 39 housing units, Housing 608. $200,000.

Ont., Mimico, etc.—Lakeshore Progressive Club Hospital Com., Mimico, 150 bed hospital to serve lakeshore area of Mimico, N. Toronto and Lang Branch. $276,000. Post, New Toronto, pres.

★**Que., Joliette**—Les Souers de la Providence, Joliette, 4 story, bsmt., 50x ft., rein.-con. hospital, Monseau St. $500,000.

Que., L'Islet—Sisters of Bon Pasteur, Lachevrotiere St., Quebec City, plans by Dufresne, 143 Royale St., Beauport, and Leclerc, Rimouski, normal school, $300,000.

BIDS ASKED

Pa., Phila.—K. F. Otto, archt., Market St., Upper Darby, 62 six room, brick row homes, for Owner, c/o Architect, $300,000.

CONTRACTS AWARDED

★**Tex., Harlingen**—Case La Guerra Co., c/o C. Carruth, 101 E. Van Buren, 86 concrete dwellings, to F. Parker, Harlingen, **$550,000.** CD 10/3—ENR 10/5.

Tex., Houston—Kerlin Homes, Inc., First National Bank Bldg., thirty 1 story frame, sheetrock dwellings, 6000 Blk. Golden St., Enfield addn., day labor, $150,000. T. McCleary, 2017 W. Gray St., archt.

★**Wash., Seattle**—R. E. Rogers, 100 Queen Anne Ave., 106 houses at 28 Ave. S.W. & W. Holden St., day labor. **$636,000.** Stuart & Durham, 4 and Cherry Bldg., Zeus & archts.

INDUSTRIAL BUILDINGS

...ed WORK
...dif., Los Angeles—PLANT—Beal Shaw, ... Santa F Ave. plans by J. R. Friend, ... W. 5 St., San Pedro, rein.-con. bldg. ...ssortion machinery, $76,000.
...ke, Denver—PARTS BLDG.—Ford Motor ... 3300 Schaefer St., Dearborn, Mich., ...e bldg., E. 40 St. on C. B. & Q. ...tage
...d, Frankfort — PLANT — Swift & Co., ... S. Packers St., Chicago, Ill., soybean ...t, incl. rein.-con. elevators, extraction ... processing bldg., utility and office bldgs., ...dge of city, $100,000 or more incl. equip.
...t, Indianapolis—PIPELINE TERMINAL ...hio Oil Co., Washington Ave. at Belt, ...000 bbl. pipeline terminal, $40,000 or ...e with equip.
...ion, Boston—FAN HOUSE—New York, ...y Haven & Hartford R.R. Co., E. E. ...ait, ch. engr., Water St., New Haven, ...n., soon lets contract, 1 story 40 x 185 ... brick, concrete fan house, appurtenant ...ilities, Northern Ave.
...ion, Boston — SHOP — New York, New ...ven & Hartford R.R. Co., E. E. Oviatt, ... engr., Water St., New Haven, Conn., soon ... contract, air conditioning shop, brick, ...dry St.
...ch., Detroit—FACTORY—Cadillac Motor ... of General Motors Corp., 2860 Clark ..., plans by Argonaut Realty Co., 308 ...eral Motors Research Bldg., brick, steel, ...-con. bldg., for addn. to tank assembly ...t. $150,000.
...No. St. Charles—PLANT—American Car ... & Foundry Co., F. A. Stevenson, pres., 30 ...rch St., New York, N. Y., 2 brick, con- ...e railroad car mfg. plant bldgs. $1,500,- ... with equip.
... J. Clifton — STORAGE — Hoffman-La- ...he, Kingsland Rd., Nutley, plans by Fell- ...er & Wagner, 155 E. 42 St., New York, ...T., 1 story, 100 x 127 ft., vitamin storage ..., poured concrete, structural steel, ...k. $50,000.
... J., Newark — WAREHOUSE — Fiske ... Refining Co., 129 Lockwood St., plans ...R. C. Klemm, 944 Broad St., 2 story, ...nt., 75 x 175 ft., brick, warehouse and ... bldg. $100,000.
... J., Paterson — LAUNDRY — Prospect ... Laundry, 371 N. 11 St., soon lets contract ...ory, frame, concrete block laundry addn., ...000. I. E. Erydanus, 192 Fairview Ave., ...pect Park, archt.
...sh., York—COLD STORAGE PLANT, etc. ... Sack, pres. York State Bank, York, ... soon cold storage bldg. and food process- ... plant. $250,000. A. Benberg, 1036 New ... Life Bldg., Kansas City, Mo., engr. ...archt.
... D., Fargo—PLANT—Sweetheart Bak- ...Co., Bismarck, G. Olson, local mgr., ...esale bakery plant. $150,000. Site pur- ...ed.
... Bellevue—ROUND HOUSE—New York, ...ago & St. Louis R.R. Co., J. C. Wallace, ...engr., Terminal Tower, Cleveland, O., ...d house addn., 8 stalls and pits, brick, ... concrete, $100,000
...e., Clackamas — SLAUGHTER HOUSE, ...-Oregon Livestock Cooperative, Clack- ... slaughter house, cold storage plant ...quick freeze unit. $100,000.
... Lancaster—PLANT—Armstrong Cork ...Liberty and Mary Sts., plans by W. H. ...Schaff Bldg., Phila., 5 story, brick, steel, ...rete bldg. C. H. Wolf, Otis Bldg., Phila.,
... Pittsburgh—RAISING ROOF BAY, ...-American Radiator & Standard San- ...Corp., Bessemer Bldg., raising 33 x ... roof bay and installing Rotablast ...g cleaning machine, $97,185.
..., Alamo—PACKING PLANT—L. John- ...J. King, Alamo, 1 story citrus and ...able packing plant, brick, hollow tile, ...ete. $40,000.
..., Bryan—FROZEN LOCKER PLANT, ...Brazos Co. Producers Co-Operative ... Bryan, plans by P. G. Norton, 9 ...r Bldg., 1 story frozen locker plant and ..., brick, hollow tile, rein.-con., incl. ... room, loading docks, grading, pav- ...tc. $48,000.
... Houston — WAREHOUSE — Bettis ... Co., 1507 Maury St., plans by H. ..., 2008 W. Alabama St., 1 story, 90x124 ...ics., rein.-con., hollow tile warehouse, ...0.
..., McAllen—PACKING PLANT—South ... Produce Co., 1901 Beech St., 1 and 2 ... citrus packing plant unit, brick, rein.- ...$40,000.
..., Mercedes—PROCESSING PLANT— ...-Heaner Co., Mercedes, 1 and 2 story ... and vegetable processing plant, brick, ...te. $45,000
..., Mercedes—PACKING PLANT—Mer- ... Citrus Growers, Mercedes, soon lets ...ct 2 story, citrus and vegetable pack- ...ant unit, hollow tile, rein.-con. $42,000. ...7—ENR 9/14.
..., Mission — PROCESSING PLANT — ... Smith Furit & Vegetable Farms, ..., 2 story, frame, metal processing ... $40,000.
..., Raymondville—MILL—Southwestern ... Oil Mill Inc., c/o J. W. McKelvey, ...merce St., Harlingen, 65x125 ft. cotton ...l, frame, sheet metal. $100,000.

AIR EXPRESS

the shortest distance between two points!

FAR SHORTER BY THE CLOCK—one mile is 20 seconds in the air!

SPECIFY AIR EXPRESS. Get your shipment the fastest way!

NOTE TO SHIPPERS: Ship order when ready, early-day shipping means quicker delivery.

A Money-Saving, High-Speed Tool For Every Business

With additional planes and space available for all urgent cargo, 3-mile-a-minute Air Express directly serves hundreds of U.S. cities and scores of foreign countries. And shippers nationwide are now saving an average of more than 10% on Air Express charges—as a result of increased efficiency developed to meet wartime demands.

WRITE TODAY for "North, East, South, West"—an informative booklet that will stimulate the thinking of every executive. Dept. PR-11, Railway Express Agency, 230 Park Avenue, New York 17, N. Y., or ask for it at any local office.

AIR EXPRESS
AIR EXPRESS
Gets there FIRST

Phone RAILWAY EXPRESS AGENCY, AIR EXPRESS DIVISION
Representing the AIRLINES of the United States

EXPERIENCED EXCAVATORS
STANDARDIZE
ON PAGE *Automatic* DRAGLINE BUCKETS

Experienced excavators have reasons for standardizing on Page Automatics—greater yardage and economy.

Page Automatics are used in 90% of the nation's coal stripping operations and are heavily depended upon in such fields as phosphate mining, levee building, industrial stripping, channel digging, flood control and reclamation work.

Because of their "Automatic Design," Page buckets must dig right in. They get a full load fast . . . save time . . . reduce wear and tear on buckets, machines and operators.

PAGE
Automatic DRAGLINE BUCKETS
PAGE ENGINEERING COMPANY, CHICAGO 38, ILL.

WATER *is no Obstacle . .*
WITH 'COMPLETE' WELLPOINTS

☆ ☆ **GROUND WATER—the first hurdle the construction engineer must lick—is merely routine step number one, if patented *"Complete"* Wellpoints are on the job.**
Sale or Rental. Call *"Complete"* and forget your water problems.
2 to 5 Stage Jetting Pumps Available.

COMPLETE WELLPOINT SYSTEMS

COMPLETE MACHINERY & EQUIPMENT CO. INC.
Long Island City 1, N. Y.
BRANCH WAREHOUSE—Gary, Ind.

INDUSTRIAL BLDGS. (Proposed Work Cont'd.)

Tex., Weslaco—MACHINE SHOP—Valley Growers Gin & Supply Co., 210 Illinois St., brick, concrete machine shop. $40,000.

Wis., Manitowoc—GERMINATING HOUSE—Wisconsin Malting Co., 605 S. 21 St., 4-story, 34x103 ft., brick, steel, concrete germinating house addn. L. E. Peterson, E. Wisconsin Ave., Milwaukee, Zone 2, engr.

B. C., Vancouver—PLANT—Durable Toy Ltd., 418 Pacific Bldg., machine tool, mfg. plant, brass foundry and metal plat

B. C., Vancouver — MINING DEVELOPMENT—Quebec Gold Mining Corp., 360 James St., Montreal, Que., mining development, necessary structures. $50,000.

B. C., Victoria—PLANT—B. C. Electric Co., 426 Carroll St., Vancouver, generating unit at Brentwood plant. $150,000.

N. B., Grand Harbour—POWER PLANT—N. B. Electric Power Co. Ltd., Saint John, enlarging diesel power plant. $50,000. Brown, c/o owner, engr.

Ont., Brantford—PLANT—Crown Electrical Mfg. Co. Ltd., 7 Sydenham St., plant. $100,000. Site purchased.

Ont., Cobalt—SMELTER—Silanco Mining & Smelting Corp., Cobalt, 10 ton smelter. H. T. Leslie, c/o owner, engr.

Ont., Empire—MINING DEVELOPMENT—Tombill Gold Mines Ltd., 25 W. King St., Toronto, mining plant. $100,000 available.

Ont., Foresters Falls—MINING BLDGS.—Mid-Canada Magnesium Mines, Ltd., 12 Richmond St., Toronto, mining and administration bldgs., offices, workmen's homes, $150,000. N. B. R. Gordon, Canada Life Bldg., Toronto, engr. CD 10/12.

Ont., Hawkesbury—PLANT—Prescott Mineral Products Ltd., c/o T. Higgins, Hawkesbury, plant. $50,000.

Ont., Kitchener — PLANT — Muraw Furniture Co. Ltd., Kitchener, furniture mfg. plant. $50,000.

Ont., London — FACTORY — Imperial Tobacco Co., 3810 St. Antoine St., Montreal, Que., tobacco factory. $250,000.

Ont., Mimico (Toronto)—MILL—Hume Engineering Co., Ltd., 347 Church St., building mill and construction of shed 270 ft., concrete block. $75,000.

Ont., Niagara Falls—BOILER HOUSE, etc.—Stanford Collegiate Vocation Utilities, 1175 Drummond Rd., plans by S. B. Coon & Son, 4 Thomas St., Toronto, 28x52 ft., reinforced con. boiler house, 85 ft. radial brick chimney, 45 ft. concrete tunnel. S. M. Peterkin, 57 W. Bloor St., Toronto, engr.

Ont., Toronto—FACTORY—J. H. Barry Ltd., c/o B. M. Singer, 55 York St., factory. $40,000.

Ont., Toronto—REPAIR SHOP—W. A. McDowell Motors Toronto Ltd., c/o C. Howard, 100 W. Adelaide St., automobile repair shop, etc. $40,000.

Ont., Toronto — PLANT — Manning Bowman & Co., Canada, Ltd., c/o A. McMillan, Oakville, electrical appliances, accessories, etc. mfg. plant. $40,000.

Ont., Toronto—REFINERY—Swift Canadian Co., Ltd., 1960 St. Clair Ave., Toronto, altering refinery. $57,000.

Ont., Virginiatown—MILL—Kerr Addison Gold Mines Ltd., 80 W. King St., Toronto, mill, etc. $100,000.

Ont., Windsor—DAIRY—Borden Co. Ltd., Windsor, plans by J. C. Pennington, Commerce Bank Bldg., dairy exten. $80,000.

Ont., Windsor—FACTORY—Timken Roller Bearing Co., 1835 Dueber Ave. S.W., Canton, O., factory. $50,000.

Que., Belleterre—MINING PLANT—Ashley Gold Mines Ltd., Belleterre, essential mining plant bldgs. $50,000. J. P. Norris, owner, engr.

Que., Drummondville — FACTORY — Rouge Industries Ltd., Drummondville, factory. $40,000.

Que., Montebello — FACTORY — Blais Sons, Montebello, sash and door factory, mill, etc. $40,000.

Que., Thetford Mines—MINE—L. C. P. Co. Ltd., Thetford Mines, developing stone mine. $40,000.

STERLING PUMP

STERLING QUALITY

SIMPLE
DEPENDABLE
RUGGED
•
CHOICE OF
LEADING
CONTRACTORS
•
WRITE FOR
LITERATURE

STERLING MACHINERY CORPORATION
405 Southwest Blvd. Kansas City

INDUSTRIAL BLDGS. (Bids Asked, Cont'd.)

Bids Asked About November 13

Colo., Denver—DIESEL SERVICE—Chi-ago, Burlington & Quincy R. R. Co., . E. Clarke, ch. engr., 547 W. Jackson lvd., Chicago, Ill., diesel service bldg., acilities. Approx. $500,000. CD 8/11—ENR 7/21.

O., Akron—LABORATORY—Goodyear Tire & Rubber Co., c/o A. Armstead, 1144 E. Market St., 1 story, 80 x 160 ft., brick, steel, oncrete synthetic rubber research labora-ory, J. G. Turnbull, 2630 Chester Ave., Cleveland, engr.

O., Barberton—FACTORY—Seiberling Rub-er Co., 245 15 St., 3 story, 60 x 80 ft., rick, steel, concrete addn. Factory 59. 0,000.

Pa., Conshohocken—STEEL MILL—Alan Wood Steel Co., Conshohocken, steel mill and oundation work.

Pa., Rouseville—DEWAXING PLANT—Pennzoil Co., J. M. Himna, in charge Drake Bldg., Oil City, 1 and 2 story, brick, oncrete bldgs., towers and tanks for ethyl-ethyl-ketone solvent dewaxing plant, 1,000,000.

Tex., Bishop — BUTADIENE PLANT — Celanese Corp. of America, Bishop, utadiene plant. $3,000,000. Gasoline Plant onstr. Corp., Bishop, consult. engrs. CD 0/15—ENR 10/12.

CONTRACTS AWARDED

Colo., Denver—PACKING PLANT—Adams acking & Provision Co., 5300 York St., gen-ral contract 1 story, bamnt., 100 x 100 ft., ein.-con., brick packing plant, to E. J. ones, Jr., 1010 S. Josephine St. Est. $40,000 ilus Gorden D. White, 615 Columbine St., rcht.

Conn., East Hartford (br. Hartford)—EST PLANT—Hamilton Standard Propel-rs Div., United Aircraft Corp., 400 Main t., 1 story, 112 x 212 ft. test plant, to urner Constr. Co., 38 Newbury St., Boston, ass. Est. over $40,000. Bids 10/5. CD 9/28—ENR 10/6.

Conn., Waterbury — GARAGE, etc. — Sco-ille Mfg. Co., 99 Mill St., brick, concrete arage and retaining wall, River Wall, East ard. to Turner Constr. Co., 38 Newbury t., Boston, Mass. $63,500.

Ga., Atlanta—DISTRIBUTION PLANT—tlanta Dairies, Inc., H. F. Stubbs, pres., str. plant, to G. Beers, Red Rock Bldg., 0,000. Bids 10/3. F. M. Daves, 774 Spring t. N. W., archt.

Ill., Paris—FOOD LOCKER — Edgar Co. ocker Service Co-Operative, Paris, general ontract, 1 story, 70x110 ft., brick, concrete nd glazed tile food locker bldg. incl., laughter house, to Brockmeyer Constr. Co., issouri Theatre Bldg., Grand Blvd. and ucas Ave., St. Louis 3, Mo. Est. $50,000. ids 9/27. H. K. Graff, 2825 Olive St., St. ouis 3, Mo., archt.

Ind., South Bend—FACTORY—Empire Box o., 2402 W. LaSalle St., 1 story, brick, con-rete factory addn., to Sollitt Constr. Co., 8 E. Sample St. Est. $40,000. Awarded 0/4. Maurer & Maurer, 312 Lafayette Bldg., rchts.

Mass., Charlestown (sta. Boston)—FAC-ORY, etc. — Davidson Rubber Co., 50 righton St., 1 story, 35 x 77 ft. and 55 x 0 ft., brick, steel, concrete, factory and ice units, to Sawyer Constr. Co., 31 St. ames Ave., Boston, Est. $55,000. Bids 9/20. D 9/24—ENR 9/28.

Mass., Springfield — STORAGE — Moore rop Forging Co., 32 Walter St., 1 story, x 220 ft. steel storage bldg., Birnie St. wner builds. $40,000. A. J. Daniels, Shrews-ry, archt.

Mich., Detroit—DIE SHOP—Murray Corp. f America, 7700 Russell St., die shop factory ddn., brick, steel, concrete, to A. A. Smith, 1 Penobscot Bldg., $100,000. CD 9/1—ENR .

Mo., St. Louis — WAREHOUSE — Charter ak Stove Co., Conduit and Antelope Sts., ne 15, warehouse alterations, rein.-con. ding dock with canopy, etc., to Murch-rvis Co., Inc., 718 Locust St., Zone 1. . $40,000.

Mo., St. Louis — WAREHOUSE — Sterling luminum Products Co., 2320 Magazine St., ne 6, 1 story, 42x54 ft. brick warehouse in., 2330 Magazine St., to John Hill nstr. Co., 915 Olive St., Zone 1. Est. $40,- with equip.

N. J., Clifton—FINISHING BLDG., etc.—reka Printing Co., 767 Paulison Ave., 2 7, bamnt., 52 x 162 ft., rein.-con. steel shing and storage bldg., to Austin Co., Rector St., New York, N. Y., $150,000.

N. J., Clifton—SPRINKLER SYSTEM—eral Telephone & Radio Corp., 200 Mt. mant Ave., sprinkler sys. for 185 x 224 mfg. bldg., to James H. Merritt & Co., E. 27 St., New York, N. Y., $35,000.

w., Condon—GRAIN ELEVATOR—Con-Grain Growers Coop. Assn., Condon, 315,- bu. grain elevator, 162 ft. high, to Henry rg & Sons, 502 Main St., Spokane, Wash., Midwest Constr. Co., The Dalles, $139,- Awarded 10/10. CD 4/7—ENR 4/13.

w., Mikkalo — GRAIN ELEVATOR — don Grain Growers Corp., Condon, 135,- bu. grain elevator, 130 ft. high, to Henry rg & Sons, 502 Main St., Spokane, Wash., Midstate Constr. Co., The Dalles, $90,000. rded 10/10.

EAGLE
LOG WASHERS

One of the features which make Eagle Log Washers outstanding in economical performance is their bearings.

All the end thrust of the log shafts is taken by Timken roller bearings, which operate above the water line. There is absolutely no chance for grit to wash into the bearing, as it is properly sealed as shown in the picture. The ball-and-socket type bearing cartridge is held in position with a centering pin of ample size to transmit all thrust loads to the heavy end casting. Shims between the cap and the housing effectively compensate for any wear.

At the lower end, the shaft rests in Marine Type bearings, made of impregnated fabric, which have proved superior to anything yet developed for this application. All wear is taken by replaceable wearing sleeves installed on the shaft. These bearings are water washed and lubricated, eliminating excessive wear and expense. Clamped to the shaft just back of the bearing is a protector which seals the bearing, and also holds the pressure in the bearing and keeps particles in solution from washing into the water groove. Eagle engineers perfected this bearing arrangement, which is an exclusive feature—and one of a number of points of superiority—of Eagle Washers.

Protector which seals bearing and prevents slurry from entering bearing.

Your Guide to Greater Output at Lower Cost

Catalog No. 44 contains complete information on Eagle Classifying and Dewatering Equipment. Send for your copy.

EAGLE IRON WORKS
142 Holcomb Ave., Des Moines, Ia.

EAGLE *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS
CLASSIFIERS — REVOLVING SCREENS
EAGLE IRON WORKS
DES MOINES, IOWA
"SERVING INDUSTRY FOR OVER SEVENTY YEARS"

WELLMAN WILLIAMS TYPE BUCKETS

Staying Power

Wellman Buckets stay right in there slugging it out in the toughest, roughest going.

WELDED ROLLED STEEL CONSTRUCTION is one big reason for LONGER BUCKET LIFE!

Send for Free Bulletin

Tell us about your particular requirement and we will send full description of construction and special features in bulletins which clearly proves why YOUR NEXT BUCKET SHOULD BE A WELLMAN-WILLIAMS.

Multiple Rope & Power Arm Types
Dragline • Power Wheel • Dredging
Special Service Buckets
⅜ to 1½ Yd. Capacities

THE WELLMAN ENGINEERING COMPANY
7000 Central Ave. Cleveland 4, Ohio
Sales and Service Agencies in principal cities

"GUNITE" CONCRETE

For • Steel Plate Lining • Steel Encasement • Building Walls, Roofs, Facings • Tunnel Lining • Water Reservoir Lining • Power Plants — Bunker Lining • Sewer Repairs • Tank Lining • Canal and Ditch Lining • Repairs of Disintegrated Concrete, Brick, Tile, Masonry

• • WRITE • • • PHONE • • • WIRE • •

GUNITE CONCRETE AND CONSTRUCTION CO.

1301 WOODSWETHER ROAD • KANSAS CITY, 6, MISSOURI

DISTRICT BRANCH OFFICE: 228 N. LaSalle Street, CHICAGO, ILL.

BRANCH OFFICES: ST. LOUIS • DENVER • DALLAS • HOUSTON • NEW ORLEANS

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Ore., Portland—COLD STORAGE PLANT—Challenge Creameries, 1319 S.E. 12 St., 2 story, rein.-con. first floor, wood second floor and bsmnt. cold storage plant, S.E. Division and E. 7 Sts., to Ertz & Burns, Pittock Block, Portland, **$130,000.** Awarded 10/11.

Ore., Portland—IN-PLANT FEEDING—Commercial Iron Works, foot of S.W. Gibbs St., 1 story in-plant feeding bldg., to Howard Halvorson Co., 3218 N.E. Sandy St., **$31,140.** Awarded 10/11. Freeman & Hayslip, Postal Bldg., archt. W. Tobey, c/o owner, engr.

Pa., Lock Haven—PLANT—A. Rinella, 10 E. Main St., industrial bldg., to John A. Robbins, Inc., 10 S. 18 St., **$70,000.** Awarded 10/9.

Tex., Donna—PLANT—Knapp Bros. and Sherriff & Koehle, Donna, 2 story citrus and vegetable packing plant, force account, **$45,000.** CD 10/3—ENR 10/5.

Tex., Edinburg—SHOP—Crow Iron Works, Mission, 1 story shop, force account. Approx. **$40,000.** CD 10/4—ENR 10/12.

Tex., Edinburg—PLANT—H. Rouw Co., Edinburg, 1 story citrus packing plant addn., brick, rein.-con. day labor. **$43,000.** CD 10/3—ENR 10/5.

Tex., Mercedes—PLANT, etc.—Rio Farms, Inc., Edcouch, gra.n dehydration plant, 6 storage tanks, force account. **$41,000.** CD 10/10—ENR 10/12.

Tex., Mercedes—PLANT—Rio Foods, Inc., Mercedes, citrus and vegetable processing plant, to Noser Constr. Co., State Bank Bldg., McAllen, approx. **$44,000.** Awarded 10/7. CD 10/3—ENR 10/5.

Tex., Mission—PACKING PLANT—Braden & Zey, Mission, 1 and 2 story citrus packing plant, force account. **$44,000.** CD 10/11.

Tex., Mission — PACKING PLANT — Schmidt Packing Co., Mission, 2 story, citrus packing plant unit, brick, rein.-con. day labor, **$45,000.** CD 10/3—ENR 10/5.

Tex., San Antonio—WAREHOUSE—Merchants Ice & Cold Storage Co., 1305 E. Houston St., 104x145 ft., rein.-con. warehouse to C. L. Browning, Jr., 812 Insurance Bldg., **$51,000.** W. E. Simpson, 1445 Milam Bldg., engr.

★**Tex., Sun Ray** — PLANT — Continental Carbon Co., Sun Ray, design and construction carbon black plant, to United Engineers & Constr. Co., 1401 Arch St., Phila., Pa., **$1,200,000.**

Wis., Beloit — FACTORY — Beloit Iron Works, 2 St., 1 story, 60 x 190 ft., brick, steel, concrete factory addn., to Cunningham Bros., 359 E. Grand Ave. W. F. Dolka, 189 W. Madison St., Chicago, Ill., engr.

Wis., Racine—FACTORY—Modine Mfg. Co., 1202 17 St., 1 story, 72 x 120 ft., brick, steel factory addn., concrete fdn., to Nelson & Co., Inc., 1550 Yont St.

Wis., Wausau — FOUNDRY — Marathon Fdry. & Mach. Co., 1212 West St., 1 story, 100 x 120 ft., brick, steel, foundry addn., concrete fdn., to C. J. Lang, 203 Bway. Oppenhamer & Obel, Wausau, archts.

Wis., Wausau — FACTORY — Pied Piper Shoe Co., 325 N. 1 Ave., 2 story, 30 x 50 ft., brick, tile, steel joist factory addn., to H. G. Hall, 105 Sturgeon Eddy Rd. Oppenhamer & Obel, Wausau, archts.

Que., Montreal — LAUNDRY, etc.—E. Northorpe, c/o G. D. Thompson, archt., 2049 McGill College Ave., 1 story, concrete laundry and garage, concrete fdn., to D. Bremer Constr. Co. Ltd., 2049 McGill College Ave., **$40,000.**

Que., Westmount—PLANT—Bristol Myers Co. of Canada Ltd., 3035 St. Antoine St., 6 story, 26x85 ft., brick, chemical plant addn., concrete fdn., to J. L. Guay & Brother Ltd., 437 Guy St., Montreal. Est. **$40,000.** H. & Labelle, 3 Kelvin Ave., Outremont, archt.

Que., Quebec City—WAREHOUSE, etc.—Goodyear Tire & Rubber Co. of Canada, Ltd., 19 Rue de la Couronne, warehouse and office, Lallemond and Dorchester St., to Francois Jobin, Inc., 88 St. Louis Rd. About **$65,000.** CD 10/4—ENR 10/12.

UNCLASSIFIED

PROPOSED WORK

★**Colo., Denver**—TRACKAGE—The Colorado & Southern Ry. Co., H. R. Clarke, ch. engr., 547 W. Jackson St., Chicago, Ill., trackage and yard office in Denver yards, $530,000.

Arkansas — POWER LINE — Arkansas Power & Light Co., Simmons National Bldg., Pine Bluff, 31.4 mi. power line, Stone Co., $25,080; 42.3 mi., Drew Co., $33,880; 16.1 mi., Garland Co., $42,698; 32.7 mi., White Co., $66,001.

Ark., Harrison—SWIMMING POOL—City swimming pool. $25,000.

Colorado — RURAL ELECTRIFICATION LINES—Empire Rural Electrification Assn., Cortez. 331 mi. rural electrification lines, Montezuma Co. W. Flora, 821 E. 17 St., Cheyenne, Wyo., engr.

CLASSIFIED (Proposed Work, Cont'd.)

Colorado — RURAL ELECTRIFICATION LINES—La Plata Rural Electrification Assn., ...ange, 47 mi. rural electrification lines, La ...ata Co. $50,000. Rocky Mtn. Engrg. Co., ...4 California St., Denver, engr.

Colorado — RURAL ELECTRIFICATION LINES—San Miguel Rural Electrification ..., San Miguel, 75 mi. rural electrification ..., Montrose Co. $50,000. G. R. Pickel, ...erance Bldg., Denver, engr.

Illinois — RURAL ELECTRIC LINES — ...thern Illinois Electric Co-Operative, ...ngola, addnl. rural electric lines, Union ... $50,000. REA allot.

Kan., Hays—AIRPORT—City, L. Servis, ...y mgr., plans $100,000 bond election, air... expansion.

Ky., Garrett—SPUR TRACK—Chesapeake ... Ohio Ry. Co., C. Miller, ch. engr., 825 W. ...hia St., Richmond, Va., restoring spur track ...d tipple track. $43,325.

Ky., Millport—RAILROAD—Louisville & ...shville R.R. Co., C. H. Blackman, ch. ...gr., 908 W Bway., Louisville, Zone 1, ...11 mi. independent branch line railroad. ...53,516.

Louisiana and Mississippi—OIL PIPE-LINE, etc.—Oklahoma Pipe Line Co., Natl. ...nk Tulsa Bldg., Tulsa, Okla. and Standard ...il Co., Pipe Line Dpt., Standard Oil Bldg., ...hreveport, La., installing, maintaining 8 ... oil pipeline, telephone cable under and ...ross Mississippi River, approx. 9 mi. north ...f Natchez, Miss., about mile 368.3 above ...ead of Passes, Concordia Parish, La. and ...dams Co., Miss.

Minnesota — GENERATING FACILITIES, ...c.—Rural Cooperative Power Assn., Maple ...ake, generating and transmission facilities ...in. 76, Hennepin Co. $230,000 REA allot.

Missouri—RURAL ELECTRIC LINES—...arton Co. Electric Co-Operative, Lamar, ...ral electric lines, Barton Co. $75,000 REA ...llot.

Missouri—ELECTRIC LINES—Pemiscot-...anklin Electric Co-Operative, Hayti, addnl. ...ectric lines, Pemiscot Co. $65,000 REA ...llot.

No., Overland (P. O. St. Louis)—PARK—...ty, c/o City Clerk, Overland, St. Louis, ...ne 14, $125,000 bond election Nov. 14, ...equisition of site and development city ...rk incl. recreational facilities, etc.

N. J., Atlantic City—PIER—Heinz Ocean ...ier Co., 9 S. Penn. Ave., pier at Massachu-...tts Ave. and Boardwalk. $50,000 or more. ... E. Bakenhus, 142 Maiden Lane, New York, ... Y., engr.

N. J., Belle Meade—SPRINKLER SYS-TEM—U. S. Eng., 120 Wall St., New York 5, ... Y., bids soon sprinkler sys. $300,000.

N. Y., Idlewild—HANGARS, etc.—Dpt. ...arine & Aviation, Pier A, North River, New ...ork, Zone 4, plans by Delano & Aldrich, ...6 E. 38 St., New York, hangar and miscel-...aneous bldgs. at airport; bids soon, sewers. ... Downer, 30 Rockefeller Plaza, New York, ...ne 20, engr.

N. C., Charlotte—PARK—Marathon Chap-...r of the Order of Ahepa, J. Carabateas, ...ey., 500 E. Park Ave., park on 40 acre ...act near Berryhill School, incl. pavilion, ...ks, etc. $25,000. G. Kestakes, pres.

Pa., Phila.—LIGHTING, etc.—U. S. Eng., ...an Mutual Bldg., 6 and Walnut Sts., Phila., ...mpleted plans electric fence lighting and ...ading, Hog Island.

Texas and Mexico—GAS LINE CARRIER—...ited Gas Corp., United Gas Bldg., Houston, ...placing 4 in. natural gas line carrier with ...in. pipe, starting from point in Webb Co., ..., and running across border into Nuevo ...redo, Mexico. $50,000.

Tex., Fort Worth—TRAIN CONTROL SIG-...L SYSTEM—The Chicago, Rock Island ... Pacific Ry. Co., F. W. Thompson, ch. ..., LaSalle St. Station, Zone 5, Chicago, ... Ill., constructing, install. train control ...nal sys., electrically operated, $164,985.

Tex., Orange — DRY DOCK — Levingston ...ipbuilding Co., Orange, floating drydock. ...0,000.

Tex., Wheeler—COMPRESSOR STATION—...nsolidated Gas Utilities Corp., Braniff ...g., Oklahoma City, Okla., 400 hp. natural ... compressor station, appurtenances at ...mpany's plant, near here. $30,000.

...DS ASKED

Bids Asked October 24

...C., Gastonia—AIRPORT RUNWAYS—...tonia Twp. Airport Comn., City Hall, ...oviling and grading runways. $30,000-$35,-... Plans deposit $10. P. T. Withers, Gas-...a, engr. CD 2/7—ENR 2/10.

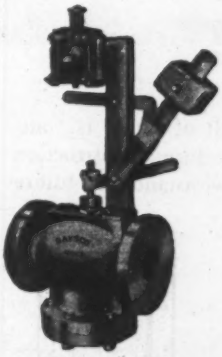
Bids Asked October 30

...ich., Mt. Pleasant — AIRPORT — City ...rk Office, Mt. Pleasant, clearing, grad-... drainage, seeding airport and laying ...crete or asphalt aprons at municipal ...port. Plans deposit $10.

...Y., Binghamton—SPRINKLER SYS-...—U. S. Eng., 120 Wall St., New York, ...e 5, sprinkler sys. $158,000. Bid date ...definitely extended. CD 10/9.

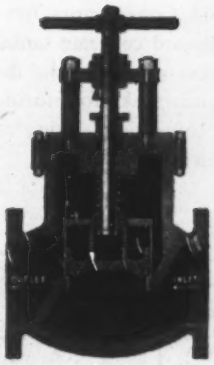
GAVSCO
Specialty Valves

Avoid breakdown and service delays by making sure it's GAVSO Valves wherever continuous service is essential! We can supply GAVSCO Valves in types and sizes to meet every service requirement, special or standard. The water service valves illustrated are merely representative of the complete line; therefore, for more information write for our latest catalog. It contains complete application and operation data on *all* GAVSCO Specialty Valves.

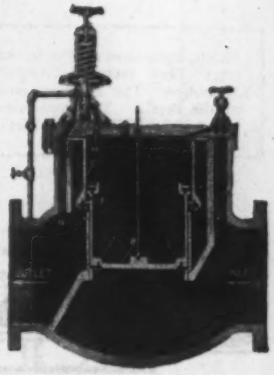


WATER PRESSURE REDUCING AND CHECK VALVE. Base Pilot pattern shown will mainain delivery pressure against higher inlet head and will prevent excess rise in downstream pressure. In closed position tight seating prevents building up of pressure on downstream side. Sizes from 3" to 36" for 150 to 400 lb. pressures.

ELECTRIC TRIP DOUBLE CUSHIONED CHECK VALVES. Solenoid operated, arranged to open or close automatically on either cycle according to sequence of service needs. Solenoid furnished for AC or DC current of any voltage. Rapid operation will not cause shock or jar. Sizes from 3 to 24 inches for 150 to 400 lbs. working pressure.



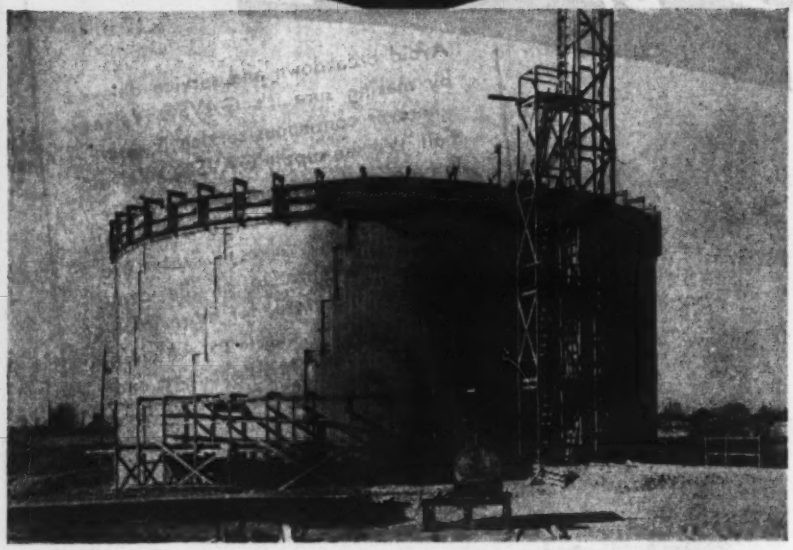
MANUAL COMBINATION CHECK VALVES. Dependable protection against reverse pressure flow, this valve features a seat ring with specially arranged V-shaped ports to permit rapid closing without shock. Valve may be opened by hand-wheel stem and held open by releasing locking latch, or it may be locked for automatic operation only. Supplied in 3" to 16" sizes to handle 150 to 400 lb. pressures.



Write today for your copy of our latest catalog

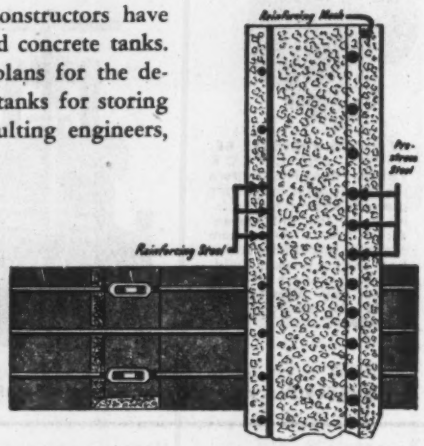
GOLDEN-ANDERSON
VALVE SPECIALTY CO.,
Fulton Bldg.,
PITTSBURGH, PENNA.

PRE-STRESSED CONCRETE
It Makes Stronger Tanks



The net force on the walls of a concrete tank full of liquid is "outward". The purpose of "pre-stressing" the concrete during construction is to give it a permanent compression to help withstand the future outward pressure.

Nicholson Engineers and Constructors have made a specialty of pre-stressed concrete tanks. They will be glad to discuss plans for the design and construction of such tanks for storing any kind of liquids with consulting engineers, general contractors or owners.



Photographs shows a Pre-Stressed Concrete Tank recently constructed by Nicholson. The drawing gives some of the details. The construction was also by the Sliding Form Method.

10-NC-1

BULK STORAGE · COAL · GRAIN · LIQUID · STORAGE · HANDLING EQUIPMENT

THE NICHOLSON CO.

CONSTRUCTION · CEMENT · OIL · CHEMICALS

Ten Rockefeller Plaza, New York 20, N. Y.

UNCLASSIFIED (Low Bidders, Cont'd.)

LOW BIDDERS

†Md., Patuxent River (br. Wash., D. C.)—AIR STATION BLDG.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., Oct. 9, armory facilities for installation centrifugal gun mount devices, Naval Air Station, NOY 10397, from Corigliano Bros., 56 Sherwood Ave., Ossining, N. Y., **$26,880.** CD 10/2—ENR 10/5.

†N. J., Newark—TIE-DOWN RINGS—U. S. Eng., 120 Wall St., New York 5, N. Y., constructing tie-down rings at Army Air Field, from Del Balso Const. Corp., 220 E. 42 St., New York, N. Y., **$29,000.** CD 9/11—ENR 9/14.

N. Y., New York—BULKHEAD SHED, etc.—Commissioner Marine and Aviation, Pier A, foot of Battery Pl., North River, Zone 4, Oct. 9, reconstructing north bulkhead shed, etc., constructing new pile platform with shed and equipment thereon at Pier 3, North River, Contr. 2399, from Agostini Bros. Bldg. Corp., 32 W. 42 St., Zone 18, **$133,643.** CD 10/2—ENR 10/5.

Pa., Phila.—WHARF—City, Dpt. P. Wks., City Hall, Oct. 9, wharf, from Kauffman Constr. Co., Schaff Bldg., **$33,020.** CD 10/3—ENR 10/5.

Wisconsin — ELECTRIC DISTRIBUTION SYSTEM—Rock County Electric Coop., Janesville, Oct. 6, 38.93 mi. electric distr. sys., REA Proj. Wis. 3-1038 A2, Rock, Dane, Green, and Walworth Counties, from Contracting & Material Co., Evanston, Ill., **$38,291.** CD 9/26—ENR 9/28.

CONTRACTS AWARDED

★**†Calif., El Toro**—AIR STATION STOREHOUSES, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., 5 storehouses, etc., Marine Corps Air Station, Spec. 14584, NOY 10151, to Robert E. McKee, 4700 San Fernando Rd. W., Los Angeles, **$1,188,000.** CD 9/14, under LB.

★**†Calif., Fairfield** — AIRFIELD BLDG., etc.—U. S. Eng., 1209 8 St., Sacramento, Zone 8, addnl. A.T.C. housing, paving and utilities, at Fairfield-Suisun Army Air Field, Spec. 966, to Moore & Roberts, 693 Mission St., San Francisco, and G. W. Williams Co., 19 California Dr., Burlingame, **$502,648.** CD 10/10—ENR 10/12, under LB.

†Calif., Oakland—NIGHT LIGHTING SYSTEM—U. S. Eng., 74 New Montgomery St., San Francisco, exten. night lighting sys., Oakland Municipal Airport, Spec. 1490-4, to American Electric Constr. Co., 462 Bryant St., San Francisco, **$38,876.**

†Del., Dover—AIR FIELD BLDG.—U. S. Eng., 120 Wall St., New York, 5, N. Y., motor repair shop, Army Air Field, Contr. W-30-075-eng-2262, to Rupert Constr. Co., 1509 French St., Wilmington, **$39,668.**

Kan., Kansas City—POWER LINE—City, underground cable, to Okonite Co., Passaic St., Passaic, N. J., **$43,943**; switchboard, to Continental Electric Co., 1517 Oak St., Kansas City, Mo., **$57,544.** Est. $140,000. Bids 10/4. Burns & McDonnell Engrg. Co., 107 W. Linwood Blvd., Kansas City, Mo., engrs.

Missouri — ELECTRIC DISTRIBUTION LINES—Northwest Missouri Elec. Co-op., 160 mi. electric distr. lines vicinity of Savannah, to Hufford & Kyger Const. Co., 810 E. 47 St., Kansas City, Mo., **$142,477.** Bids 9/18. Horton & Co., Lamar, engrs.

†Mo., St. Louis—PLUMBING, etc.—U. S. Eng., 816 U. S. Courthouse & Customhouse, Zone 2, installing plumbing, heating, ventilating and process piping sys., Neg. 23-016-45-32, to Thos. J. Sheenan Co., 2233 Olive St., Zone 3, **$452,697.** Bids 9/26.

†N. Y., Mineola—RUNWAY REPAIRS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., repairing and resurfacing runways, Naval Air Field, Roosevelt Field, NOY 10941, to W. P. McDonald Corp., 33-15 Lawrence St., Flushing, **$79,850.**

†Okla., Fort Sill—SPRINKLER SYSTEM—U. S. Eng., 231 W. Main St., Denison, Tex., water sprinkler sys. for warehouse and motor repair shops, Serial No. 41-242-44-6, to Rockwood Sprinkler Co., 931 Canal St., New Orleans, La., **$37,600.** CD 9/25—ENR 9/28.

†R. I., Prices Neck—HURRICANE DAMAGE REPAIR—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., for hurricane damage repair, Auxiliary Air Training Center, NOY 11158, to O. Ahlborg & Sons, Inc., 97 Friendly Rd., Cranston.

†R. I., Quonset Point — AIR STATION BLDG.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., No. 2 operations bldg. addn., Naval Air Station, NOY 9389, to Gilbane Bldg. Co., 90 Calverly St., Providence, **$35,790.** 9/26. CD 9/14.

†Tex., Dalhart — BOMBER TRAINER BLDG.—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, Okla., bomber trainer bldg., No. 34-966-45-10, to Ditmars-Dickmann Const. Co., Muskogee, Okla., **$29,900.** Est. $40,000.

†Tex., Pyote—AIR FIELD BLDGS.—U. S. Eng., Albuquerque, N. M., 4 unit type, 25-ft. trainer bldgs., Pyote Field, Contr. W-005-eng-272, to Jeter Constr. Co., Albuquerque, N. M., approx. **$25,000.**

Proposal Advertisements see p. 259 and 2
Postwar Projects see p. 180

EN

NE

ountable wa